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PUBLIC HEALTH REPORTS

In this issue

to the Chronically Ill
For Older People
Fluorides and Mortality
Rheumatic Diseases
Health Test Levels
Assistance in Greece

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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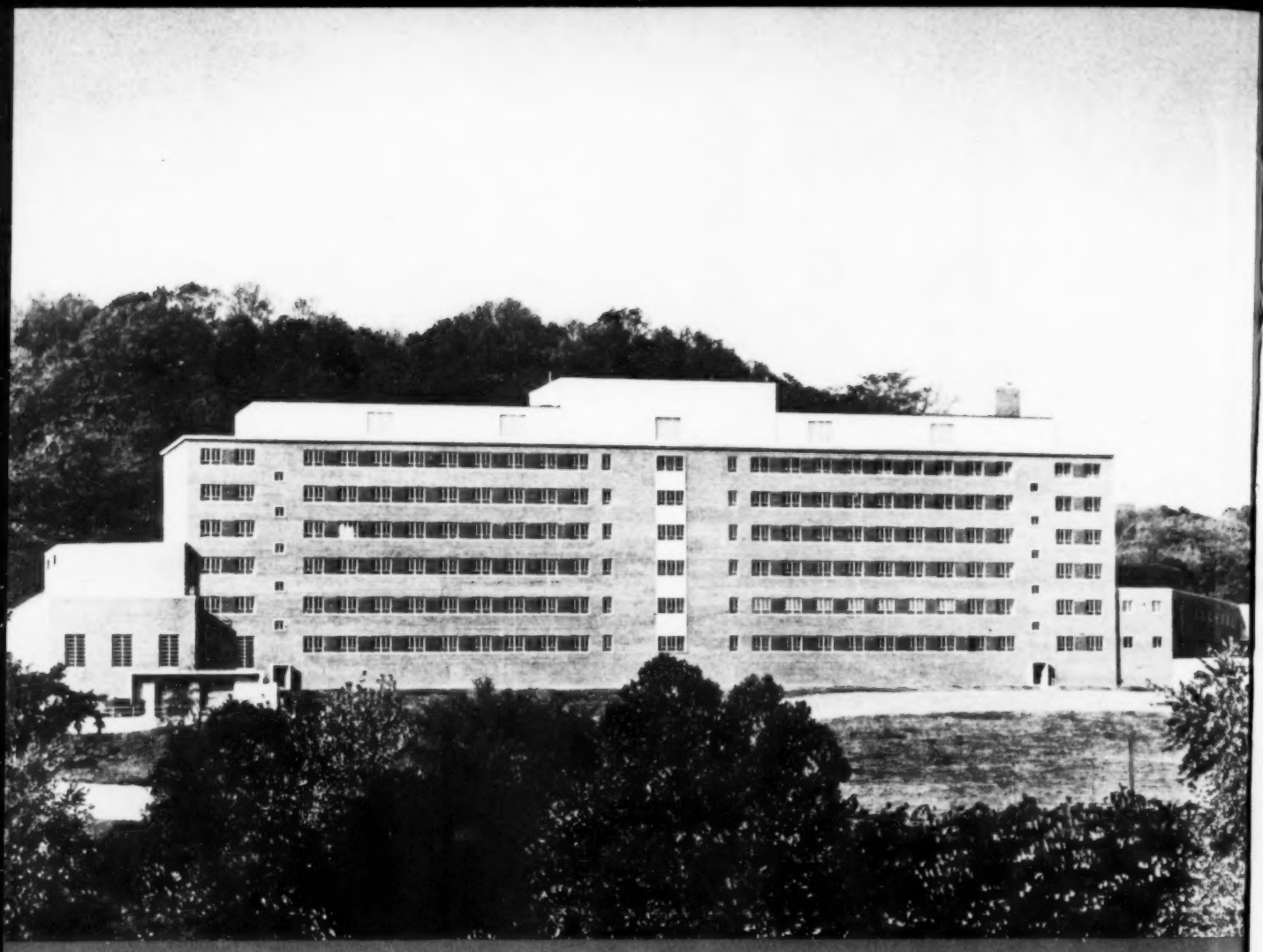

Robert A. Taft Sanitary Engineering Center

Cincinnati, Ohio

see overleaf

Volume 69 Number 5 **May 1954**

PUBLIC HEALTH REPORTS

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Contents

	Page
The test tube and slide methods in the Rh_0 testing procedure—Georgia's comparative study *E. L. Webb and Sue M. Brandon.*	425
Unknowns in vitamin C *Leslie J. Harris.*	429
A milkborne outbreak of shigellosis in Madison County, Tenn. *Cecil B. Tucker, Glenn C. Fulkerson, and R. M. Neudecker.*	432
Research activities in rheumatic diseases *Joseph J. Bunim.*	437
Formal education in sanitary science *Arthur P. Miller.*	441
Preliminary report, Advisory Committee on Weather Control	447
Waterborne fluorides and mortality *Thomas L. Hagan, Morton Pasternack, and Grace C. Scholz.*	450
Better care for older people *Leonard A. Scheele.*	455
Building positive approaches to the chronically ill	462
The social worker *Mary F. Bozeman.*	462
The nurse *Edna L. Fritz.*	465
The welfare worker *Mary S. Weaver.*	466
The volunteer *Bell Greve.*	469
Use of sound recorder in nurses' home visits *Marion Ferguson and Jeannette E. Westlake.*	471
Technical assistance in public health—The 6-year program in Greece *Robert L. Cherry and Clarke W. Mangun, Jr.*	475

Continued ▶

The Robert A. Taft Sanitary Engineering Center

The new $4-million building in Cincinnati, Ohio, which houses the Robert A. Taft Sanitary Engineering Center of the Public Health Service, was dedicated by Oveta Culp Hobby, Secretary of Health, Education, and Welfare, April 8, 1954.

The Robert A. Taft Sanitary Engineering Center, until recently the Environmental Health Center, is the focal point of the Federal Government's research and study into how the health of human beings may be affected by contacts with elements found in air, water, and food, and by radiation and other factors in the environment (see story on p. 507 of this issue of *Public Health Reports.*)

The six-story building, which is located at Columbia Parkway and Grandin Road about 6 miles east of downtown Cincinnati, is designed on a functional basis to serve present and proposed work of the Sanitary Engineering Center. Its gross floor area of 159,000 square feet is arranged on a modular plan of repeated standard units. Each unit, which is 12 by 8 feet, is provided with high- and low-voltage electricity, hot and cold water, steam, compressed air, vacuum, gas, and acid-resistant waste lines. Interior partition walls are non-load bearing and are built of 4-inch concrete block to facilitate remodeling.

Lighting is designed to provide 50-foot-candle intensity at laboratory bench level from fluorescent fixtures. Provision is made for filtered air recirculation through most of the structure. A separate air supply and exhaust system is provided for the animal quarters, and a separate system is provided for the new "purged" type hoods in the laboratories.

One special feature of the building is the 3,600-square-foot water and waste experimental area in the wing at the southeast end of the building, which provides space for pilot plant scale studies. Raw water from the nearby Little Miami River and city sewage will be pumped into this wing for such studies. Adjacent experimental areas will be used for milk and food pilot plant operations.

Other special features include: segregation of relatively "high" and "low" level radiochemistry operations; special constant temperature rooms for the microbiology, chemistry, and aquatic biology laboratories; centralized water stills from which distilled water is piped to each of the laboratory floors; and special instrument rooms to house major heavy physical equipment, such as electron microscope, emission spectrograph, electrophoresis apparatus, refrigerated ultra centrifuge, and ultra sonorator.

Contents for May, continued

	Page
Premarital health examination legislation—History and analysis—*J. K. Shafer.*	487
Survival of *C. immitis* in passage through the digestive tract of mice—*Robert Lubarsky and Orda A. Plunkett.*	494
Measuring reader comprehension of a preschool pamphlet—*Marie Ford and Evelyn E. Hartman.*	498
Effect of a combination of SO_2 and H_2SO_4 on guinea pigs—A preliminary report—*Mary O. Amdur.*	503
Laboratory research, field investigation, and training program of the Robert A. Taft Sanitary Engineering Center at Cincinnati, Ohio	507
The National Tuberculosis Association—Fiftieth anniversary—*James E. Perkins.*	513
Gamma globulin effect on poliomyelitis in 1953 field trial	519
Short reports and announcements:	
The Robert A. Taft Sanitary Engineering Center (Frontispiece)	ii
PHS staff announcement	428
Characteristics of needy aged persons	440
Grants to aid careers in medical technology	449
Note of thanks	470
Technical publications	474
Ideas	486
From *Children*	493
Committee to study artificial sweeteners	520

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH NO. 20 . . . Gamma globulin in the prophylaxis of poliomyelitis.

178 pages; illustrations. A summary and information on availability appear on pages 519–520.

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The Test Tube and Slide Methods In the Rh_0 Testing Procedure

—Georgia's Comparative Study—

By E. L. WEBB and SUE M. BRANDON

ABOUT 5 years ago, in the Georgia Department of Public Health, the division of laboratories acceded to the request of the division of maternal and child health to establish the Rh test as a routine function. Use of the tests, however, would be limited to prenatal and immediately related cases.

During the period of planning the work, it was questioned whether the Rh test should be included in a public health program, but it was decided that use of this test could be one of the connecting links between the public health and clinical laboratory fields. Use of the test for transfusion purposes undoubtedly belongs to the hospitals or clinics, while its utilization for giving information relating to erythroblastosis or hemolytic disease in the newborn is of public health importance. The participation of the Georgia State laboratories in this procedure, it was decided, would be confined to testing for the Rh_0 factor, the most potent and important of the Rh (Rhesus) antigens. Rh typing and the performance of sensitization tests or titrations could be obtained as required in hospital and private laboratories. It was thought that the adoption of this program would do much toward bringing the importance of this recently discovered blood constituent to the attention of the medical profession.

The question then arose as to the technique to be employed. Since the discovery of the Rh factor by Landsteiner and Wiener (*1*) in 1940, much has been written about its importance and the laboratory methods for its detection. In searching the literature for methodology, we found some confusion as to the most reliable test. The most desirable procedure would be one which could be applied to clotted specimens of blood submitted for the serologic test for syphilis as required by law in prenatal cases, and which could easily be adapted to a large volume of work.

Mr. Webb is associate director of the division of laboratories, Georgia Department of Public Health, with which he has been associated as a serologist since 1918. Mrs. Brandon, a bacteriologist, is supervisor of the special serology unit in the same division.

The Two Techniques

The test tube method devised and suggested by Dr. Louis K. Diamond of Children's Hospital, Boston, was selected. An experienced technician was sent to Dr. Diamond's laboratory for training in this procedure. During the period of preparation for this work, we were spared the experience of some laboratories

in regard to the low specificity of anti-Rh serum prepared from rabbits, since more specific antiserum from human sources had become available.

The selected technique consisted of the utilization of 1 drop of a 2–4-percent cell suspension in its own serum with 1 drop of anti-Rh_0 serum in a test tube and incubation in a 37° C. water bath for 30 minutes. The tests were then centrifuged for 1 minute at 1,000 r.p.m. The results were read macroscopically under suitable illumination and against a white background. Tests showing indefinite or negative agglutination were checked by low-power microscopic examination of a drop of the mixture placed on a glass slide. A drop of saline was added to the mixture on the slide if rouleaux formation was suspected.

Soon after this work was begun, we would receive an occasional report of a disagreement between our laboratory and some hospital or private laboratory which had begun the Rh test work in conjunction with transfusions. This caused concern. Having but short experience, we thought it well to begin investigating the conditions which might influence the results of this test.

Although we had been assured that this technique could be applied to clotted specimens of blood received through the mail, we began to wonder about the effect of hemolysis on the Rh test. Also, we had noted some difference in the potency of different lots of anti-Rh_0 serum. This product could be obtained only in small quantities at that time, and, therefore, change in lots frequently occurred. We were also concerned as to what constituted a drop, or if differences in the size of drops of antiserum would have any effect on the results.

The age of the specimen might be responsible for some of the discrepancies, it was also thought. Hospital or private laboratories usually performed the test on freshly collected specimens, whereas the specimens reaching the health department laboratories were probably from 1 to 3 days old. Investigations were begun in order to obtain information on these questions.

As a result, it was found that damage to some of the cells indicated by hemolysis, reflected in 120 specimens a more significant influence on the results than did the age. The strength of the cell suspensions ranging from 1 to 4 percent did not appear to effect appreciably the results in 166 specimens. Parallel tests on 436 specimens showed a difference in potency of different lots of anti-Rh_0 serums.

In routine work, Rh_0 test results are reported as positive or negative. For finer comparisons in these investigations, however, the results were recorded in "plus" terminology. Four plus (4+) represents complete agglutination, and minus (−) represents absence of agglutination. Partial agglutination in varying degree is designated by numerical values between these extremes.

The results of the study with two different lots of anti-Rh_0 serums is presented in table 1. The high percentage of negatives in this series is due to the selection of the specimens.

Table 1. Comparison of reactivity of 2 lots of anti-Rh_0 serums by the tube method on 436 specimens

Number of specimens	Anti-Rh_0 serum	
	Lot 1	Lot 2
292	4+	4+
32	3+	4+
9	2+	4+
5	2+	3+
1	1+	4+
97	−	−

A slide test procedure was being used by most laboratories in the southeastern region of the United States in their Rh testing, we learned. So, in parallel with our test tube procedure, we began to use the slide test developed and recommended by Dr. John Elliott of the blood bank of Dade County, Fla. Dr. Elliott visited the Georgia laboratories, demonstrated his technique, and instructed in its performance.

The slide test technique, also used extensively in the hospitals in Georgia, consisted of the mixing of 1 drop of anti-Rh_0 serum and 2 drops of a 40–50-percent cell suspension in its own serum on a glass slide. The slide is then placed on a view-box equipped with a special light bulb which supplies heat essential for the reaction and at the same time provides good illumi-

nation for reading the results. The view-box is tilted back and forth slowly, and the results are read at the end of 2 minutes.

The Comparative Studies

Six hundred and four specimens were examined in parallel by the test tube and slide methods as shown below:

	Number of specimens
Total agreement	600
Complete agreement—positive	496
Complete agreement—negative	104
Total disagreement	4
Positive by tube—negative by slide	0
Negative by tube—positive by slide	4

Disregarding 1+ reactions, as suggested by both Dr. Diamond and Dr. Elliott, 600 (99.3 percent) of the specimens showed complete agreement. Four (0.7 percent) specimens were negative by the test tube method and positive by the slide method. These 4 specimens also gave positive results by the test tube technique when another anti-Rh_o serum was employed.

Another comparative study of the tube and slide methods employing antiserums from 2 different sources was made on 2,010 specimens. These anti-Rh_o serums were recommended for use in either the tube or slide procedures. The disagreements are given in table 2, and the agreements are shown in the following tabulation:

	Number of specimens
Complete agreement	1,978
Positive (4+) reactions	1,711
Negative (−) reactions	267
Relative agreement	22
Positive (2+, 3+, 4+) reactions	13
Negative (± and −) reactions	9

Complete agreement was obtained in 1,978 (98.4 percent) of the specimens in this series; relative agreement in 22 (1.1 percent). Ten (0.5 percent) specimens showed some difference in degree of agglutination either in methods of testing or in lots of anti-Rh_o serum used. This study reveals a closer agreement in Rh_o testing than is usually achieved by the application of different techniques in many of the various types of laboratory examinations.

Table 2. Disagreement in Rh_o results on 2,010 specimens tested by tube and slide methods with anti-Rh_o serums from 2 sources

Tube method		Slide method		Disagreement	
Lot 1	Lot 2	Lot 1	Lot 2	Lot 1	Lot 2
4+	2+	4+	1+	1	---
2+	±	4+	4+	1	---
2+	±	−	±	---	1
2+	−	−	−	---	1
1+	−	−	−	6	---
Total (10)				8	2

Total number of disagreements	10
Total percentage of disagreements	0.5

Using Both Procedures

Following these investigations, it was felt that for better results in Rh_o testing, both the tube and slide methods should be employed. The slide test technique was, therefore, adopted as a supplementary procedure on all specimens giving a negative or slightly positive reaction by the tube method. A negative report for a specimen indicates failure to show any agglutination by either of these methods. As a result, reports of discrepancies between the Georgia health department laboratories and other laboratories have become rare.

We occasionally find a specimen which gives a slight agglutination by one method and no agglutination by the other method. Sometimes a specimen is negative by the tube method and shows a slight agglutination at the end of 2 minutes by the slide test. We were instructed to make readings at the end of 2 minutes and to disregard the clumping which occurs after that time. This, however, is difficult to do, when increased agglutination is observed at the end of 3 minutes and becomes maximum at the end of 4 minutes. Such specimens are rechecked by the tube method, using a different lot of anti-Rh_o serum. An occasional specimen is observed to give a slight agglutination by the tube method but is negative by the slide test.

In such disagreements, both tests are repeated to rule out possible error. If the discrepancy still exists, a letter accompanies the report, explaining the omission of the Rh_o test results and suggesting the submission of another speci-

men for repetition of both tests. If the subsequent specimen shows a disagreement between the 2 test methods, the report is usually marked positive with the further suggestion that the more critical Rh typing be made on that person preparatory to transfusion.

Sources of Error

Errors in test performance are always contributing factors to disagreements in laboratory examinations. Sources of error common to both the tube and slide methods of Rh testing are:

Use of anti-Rh serum after its expiration date, or when it has become contaminated.

Performance of test without due consideration of temperature.

Mistaking for agglutination red blood cells enmeshed in particles of fibrin.

Performance of tests on specimens of blood which are badly hemolyzed or grossly contaminated.

In the tube method, a too vigorous shaking breaks up the agglutination and leads to errors in reading results. Drying processes and rouleaux formation in the cell suspension and anti-Rh serum mixture are sometimes mistaken for agglutination in the slide method.

Laboratory technicians quite often become confused by the arguments of the advocates for the tube and slide test techniques in Rh testing in regard to the superiority of one of these methods. The choice of method, however, is probably less important than the ability and skill of the technician who performs the test. Every technician should receive adequate training in the Rh test before being given the responsibility of performing it and reporting the results independently. It must always be kept in mind that disagreement in results may occur at any time in the same laboratory or in different laboratories if rigid adherence is not given to prescribed techniques.

Summary and Conclusion

In the division of laboratory services of the Georgia Department of Public Health, studies were made to determine the causes of discrepancies in Rh_0 test reports from different laboratories. The tube and slide test methods were performed in parallel on large series of specimens of blood. Results with lots of anti-Rh_0 serums from two different sources are compared. Although these studies reveal a closer agreement than is usually achieved in many types of laboratory examinations, the slide test method has been adopted as a supplementary procedure to the tube method for confirmation in negative or doubtful reactions.

In Rh testing, deviations from prescribed techniques probably contribute more to disagreements in results among laboratories than does the difference in the reactivity levels of the tube and slide methods.

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PHS Staff Announcement

Leonard M. Board, chief of the Sanitation Program, Division of Sanitary Engineering Services, has been assigned to duty in Lima, Peru, as regional sanitary engineer advisor for the Institute of Inter-American Affairs of the Foreign Operations Administration. In his new position Mr. Board will give advisory service in sanitary engineering matters to the health missions in 18 South and Central American countries. Mr. Board was commissioned in the Public Health Service in 1943.

Unknowns in Vitamin C

By LESLIE J. HARRIS, D.Sc.

AMONG THE PRINCIPAL gaps remaining in our knowledge about vitamin C, the three that are especially noticeable relate to requirements, distribution, and mode of action.

Vitamin C Requirements

There is as yet no universal agreement about the amount of vitamin C required daily by man for maintaining health. We do know that as small a quantity of ascorbic acid as 10 mg. per day, or somewhat less, is sufficient to prevent scurvy. But we also know, and it is a familiar observation to everyone who has carried out vitamin assays on animals, that there is generally a wide gap between the minimum and the optimum dose—that is to say, between the relatively small amount of any vitamin needed to prevent actual lesions of frank deficiency disease and the much larger amount needed to promote full health as measured by a maximal growth response in the young animal and by normal physiological function.

Avitaminosis and Hypovitaminosis

With regard to vitamin C, the arguments in favor of the view that the optimum may be widely separated from the minimum can be marshalled under several headings.

Subscurvy in experimental animals. Tests on guinea pigs do indeed prove that the quantity of vitamin C needed to prevent so-called clinical signs of scurvy is considerably less than that necessary to obtain the full potentialities of growth in the young animal or to maintain, for example, the normal functioning of the odontoblasts. The curve of response is in fact logarithmic.

Presumptive advantages of saturation. Again, it has been argued that, so far as is known, all animal species except primates and guinea pigs can synthesize vitamin C in the body and do not need it in their diet, and that it seems a noteworthy fact that in such species Nature has arranged to maintain a state of saturation. Therefore, it is not unreasonable to suppose, as King and others have, that for human beings likewise a state of saturation may be both natural and desirable. There is reason to think, for example, that an intake of vitamin C appreciably above the mere minimum (or scurvy-preventing dose) is needed to promote the optimal healing of wounds.

Absence of direct proof. On the other side, we are forced to admit that however attractive the presumptive evidence may seem, or however

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Dr. Harris is director of the Dunn Nutritional Laboratory, University of Cambridge and Medical Research Council, and president of the Nutrition Society. *This paper is based on his summary remarks at the Lind Bicentenary Symposium conducted at the University of Edinburgh last May in honor of Dr. James Lind, author of the Treatise of the Scurvy published in Edinburgh in 1753. The Proceedings of the Nutrition Society, published by the Cambridge University Press, London, carries the full text of the symposium.*

useful a safeguard it undoubtedly is to provide a liberal intake of vitamin C, if only to insure a reasonable margin of safety, nevertheless, we have as yet no means of definitely proving that a man is in better health for receiving 30 mg. of ascorbic acid daily, the League of Nations standard of requirement (*1*), instead of 10 mg. per day, the approximate scurvy-preventing dose. We have still less direct evidence for insisting on an allowance of up to 50 or 75 mg. to meet some of the proposed American standards (*2*).

Need for functional tests. The one thing that would help more than anything else in settling this controversy about the requirements would be to have new functional tests developed to demonstrate the effect of minor degrees of deficiency. Whereas for some other vitamins such tests are already in existence, for vitamin C they are still lacking and are most urgently needed. An example of the kind of test I have in mind is the measurement of dark adaptation for vitamin A, which permits the diagnosis of a mild degree of deficiency of this vitamin before any clinical signs have become evident. Similarly, for vitamin B_1, the carbohydrate tolerance (pyruvate clearance) test originated by Banerji and myself (*3*) and applied by McCollum and others in America and elsewhere, will give evidence of some impairment in vitamin B_1 function when the deficiency is still too slight to produce the more obvious clinical manifestations of disease (*4–7*).

Likewise, for vitamin C we must look forward to seeing some functional stress-test devised. Possibly, bearing in mind Dr. Crandon's observations (*8*), it may be some kind of a local stress reaction. Only when such tests are available will it become possible to detect minor degrees of deficiency in man and hence to know what is his real optimal requirement.

Distribution

Another outstanding puzzle about vitamin C is to know why it is present in such relatively large amounts in some fruits, or in certain plant and animal tissues, and yet is almost entirely absent from other, and apparently analogous, fruits or tissues. This unevenness in its distribution would seem to be almost fortuitous. Are we then to inquire teleologically what is the purpose of these large amounts of vitamin C in some sites and the smaller amounts in others closely similar; or are we to regard it, as it almost appears to be, as just a biochemical accident? We can do little more than state the question, for there appears as yet to be little or no hint of the answer.

Mode of Action

We are still largely in the dark also about the physiology and biochemistry of vitamin C action. We cannot yet point to any precisely defined coenzyme system, such as is possible with various vitamins of the B group.

The Known Facts

What is known about vitamin C action can be summarized (for the greater part) under three headings, as follows:

Reducing action. Although it has been shown that vitamin C, by reason of its reducing activity, is able to participate in, or to stimulate, a large number of chemical reactions, this action seems largely unspecific, for other reducing agents can ofter replace the vitamin. In this direction, then, we are not much nearer explaining the characteristic action of the vitamin in preventing scurvy.

Structural effects of deficiency. All that need be said under this heading is that in the absence of adequate amounts of vitamin C the formative cells of the body, such as the odontoblasts, ameloblasts, cementoblasts, and osteoblasts, lose their normal functional activity and cease to lay down the normal type of new tissue, namely, dentine, enamel, cement, and bone. A particular instance of this is the well-known fact that with a deficiency of vitamin C the normal production of collagen is impaired.

Specific chemical effects. It is clearly established that vitamin C is involved in two distinct chemical reactions, or systems, namely: (*a*) the conversion of folic acid to folinic acid, and (*b*) the metabolism of tyrosine and related substance. An additional point here, as suggested by the new findings of King (*9*), is that in vitamin C deficiency cholesterol metabolism may also be affected. Apart from this, little is definite.

Adrenal Function

The fact that the administration of a dose of ACTH is followed by a temporary fall in the level of ascorbic acid in the adrenal gland (*10*) suggests that vitamin C may be related in some way to adrenal function. This idea is further supported by the consideration that vitamin C is present in extraordinarily high concentration in the adrenal, both in the medulla and the cortex. However, the attempts of my colleagues and myself to find evidence of a consistent relation between ACTH (or cortisone) function and vitamin C requirements have so far led to essentially negative conclusions (*11*). According to C. P. Stewart and others (*12*, *13*), ACTH and cortisone may affect the equilibrium between ascorbic and dehydroascorbic acids in the blood of human subjects. Yet our own tests failed to show any essential change in the ratio of ascorbic acid to dehydroascorbic acid in the adrenals of guinea pigs after an injection of ACTH.

Conclusion

From what has been said, it would seem helpful, then, if in our discussions and in future work, some particular consideration could be given to these three problems: (1) the quantitative requirements for vitamin C, (2) the reason for its apparently uneven distribution, and (3) the detailed nature of the specific biochemical system or systems in which the vitamin functions and the derangement of which presumably leads to scurvy.

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A Milkborne Outbreak of Shigellosis In Madison County, Tenn.

By CECIL B. TUCKER, M.D., M.P.H., GLENN C. FULKERSON, M.P.H., and R. M. NEUDECKER, M.D.

AS A RULE, reports of milkborne outbreaks of shigellosis which have appeared in the literature traced the infection to known raw milk supplies. Milk contaminated after pasteurization or improperly pasteurized may also carry infections to the consumer. Without adequate milk sanitation and the enforcement of laws and ordinances dealing with milk sanitation, the danger of the transmission of pathogenic organisms through milk is always present.

An outbreak of shigellosis traceable to milk occurred in Madison County, Tenn., in October 1952. It was the first milkborne outbreak of shigellosis reported in the State.

Features of the Outbreak

On the evening of October 14, 1952, a sudden outbreak of an illness occurred among school children and teachers in 3 Jackson grammar schools and in 1 Madison County school located approximately 5 miles from Jackson. In addition, there were a few scattered cases occurring in members of families in Jackson in age groups other than the grammar school age group.

The illness was characterized by sudden onset with nausea, vomiting, abdominal cramps, headache, fever, and diarrhea. Nausea and vomiting were such prominent symptoms in a large number of cases that other pathogenic organisms were at first suspected. Blood and mucus were present only in the stools of the more severe cases.

Most cases were mild and lasted from 2 to 24 hours. A few cases were severe with durations from 7 to 21 days with 1 or more relapses. No deaths occurred.

Stool specimens were obtained from 30 patients within 36 hours of the onset of their illness. Specimens collected were from patients from the four schools involved. Since a branch of the division of laboratories is located in Jackson, bottles for the collection of fecal specimens without preservative were provided and transported to the laboratory within 3 hours of collection. *Shigella sonnei*, type 1, was readily isolated from the stool specimens obtained from patients. A summary of the outbreak in the four schools is given in table 1.

Epidemiological Observations

Obviously there was a common source of infection in the four schools. It was also obvious that the infection was peculiar to these schools

Dr. Tucker is the director of the division of preventable diseases, and Mr. Fulkerson is sanitation consultant in charge of milk sanitation, both with the Tennessee Department of Public Health. Dr. Neudecker is director of the Jackson-Madison County Health Department.

Table 1. Shigellosis cases and attack rate per 100 students in 4 schools in Madison County, Tenn., October 1952

School	Registration	Number of cases	Percent
Total	1,923	784	40.8
Alexander	670	314	46.9
Malesus	305	148	48.5
Parkview	650	230	35.4
Whitehall	298	92	30.9

as infections were not occurring in the other schools and throughout the population of the city and county.

Since it was thought that the contaminated vehicle was eaten or drunk in the school cafeteria at lunch on October 14, 1952, detailed information on the food was obtained from a sample of children at the Alexander school. These data suggested that milk was the probable source of the infection.

A detailed investigation was made at each school. The schools did not have a common water supply. The three schools in Jackson used the city supply whereas the county school (Malesus) had a different source of water. Since the three Jackson schools were widely separated, a general epidemic would have been expected if the water had been the source of the infection.

Menus were obtained from each school for the 7 days prior to the onset of the illness. Only one of the schools served ice cream during the period. Surplus commodity dried milk and eggs were used but on no single day were these foods served in all four schools. Samples of dried milk and eggs were obtained from each school for bacteriological examination. No pathogenic enteric organisms were found.

Three of the schools purchased fresh vegetables from the same source; however, so extensive an outbreak of shigellosis would not be expected to occur from contaminated fresh vegetables. Nevertheless, samples were examined bacteriologically, and no pathogenic enteric organisms were found.

A careful study of the menus showed that the only food served by the 4 schools in common on any 1 day during the 7-day period was milk. One milk plant had a contract to supply standard pasteurized milk in half-pint bottles. In addition to the schools where the outbreak of shigellosis occurred, the plant supplied milk to nine other schools in Madison and adjacent counties. No outbreak of shigellosis occurred in the nine schools.

The milk plant delivered approximately 100 gallons of milk to the 4 schools daily. One bottle of milk which presumably had been delivered on October 14, 1952, was obtained at 1 of the 4 schools. This was the only available bottle which had been delivered on that day and none which had been delivered on the previous day was available. This sample showed a negative phosphatase test. The bacterial count greatly exceeded the allowable limits for grade A pasteurized milk. Cultures were negative for pathogenic organisms.

Additional evidence that the milk was contaminated was deemed necessary before presenting the evidence to the milk plant officials and before investigating to determine, if possible, the method by which the milk was contaminated.

Histories were obtained from 1,309 of the 1,923 students registered in the 4 schools. In order that the total sample would be similar to the sample obtained at the Alexander school, histories of the food eaten at lunch on October 14 were obtained.

The attack rates among students who drank milk and among those who did not drink milk at lunch on October 14, 1952, are given in table 2. Six hundred and thirty-nine, or 48.8 percent of the 1,309 students, became ill; 625, or 57.4 percent of the 1,088 students who drank milk, became ill, whereas only 14, or 6.3 percent of

Table 2. Shigellosis cases and attack rate per 100 students in 4 schools in Madison County, Tenn., according to milk consumption at school, Oct. 14, 1952

Milk consumption	Number of children	Number of cases	Percent
Total	1,309	639	48.8
Drank milk at school	1,088	625	57.4
Drank no milk at school	221	14	6.3

the 221 students who drank no milk on that date became ill. The attack rate among those drinking milk was nine times the attack rate among those not drinking milk.

Investigation of the Milk Plant

The investigation of the milk plant was made on the basis of the 1939 recommended Public Health Service Standard Milk Ordinance and Code. Only the most important findings are included here. The plant processed approximately 800 gallons of milk per day. Recording thermometer charts for the plant for a period of several weeks during and prior to the outbreak were studied.

On October 12, 1952, 3 of the 4 pasteurization vats in the plant were used (vats 2, 3, and 4). Only 2 recording thermometers were in operation on that day, and these were permanently mounted on vats 3 and 4. Figure 1 is a reproduction of the recording thermometer chart for vats 2 and 3 covering 200 and 150 gallons of cream line or standard milk. The record for vat 2 indicates that the holding time at the most was 18 minutes. Figure 2 is a reproduction of another original chart for vats 2 and 3 for October 12, 1952. Obviously one is a duplicate chart for the vats, since only one chart would have been used for this thermometer on this date. It appears that a "faked" chart was substituted.

Close examination of figure 2 indicates that there was no relationship between the recordings at room temperature and the recordings made for the milk pasteurized in vats 2 and 3. Furthermore, these recordings of pasteurization temperatures do not show the required emptying time when cooling is done outside the pasteurization vat. The outlet valves to the vats could have been opened at any time during the 30-minute holding period since no cooling time is indicated on the chart. It would have been impossible to have bottled the milk in the time indicated by the chart.

The chart for vat 4 was similar to the chart indicated in figure 2. It, too, appeared to have been a substitute.

There were also substituted charts for October 8, 13, and 15, 1952. Several of the charts showed multiple mountings as indicated by the enlarged and many pinholes in the axis of the charts.

The water supply source for the milk plant was investigated. It showed satisfactory sanitary protection. Samples of the water revealed no bacterial contamination.

Stool specimens were collected from the milk plant personnel. No pathogenic enteric organisms were found. The milk handlers had no history of recent enteric disease. Records at the milk plant indicated that milk was obtained from 32 producing farms. All of the producers were visited. No histories of enteric disease could be obtained. It was not deemed practical to obtain stool specimens from the milk handlers on the farms.

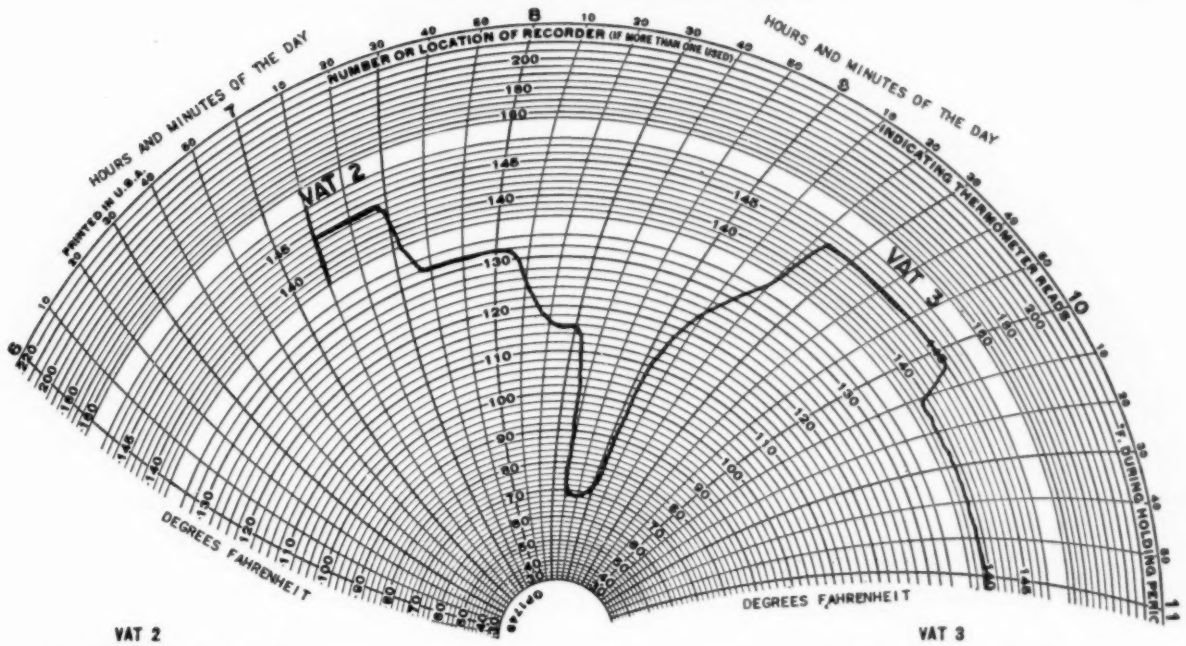
The investigation disclosed that just prior to the outbreak one of the owners of the plant and the plant superintendent had had a heated argument concerning the operation of the plant. The plant superintendent had submitted his resignation to become effective at the end of the month. The plant superintendent, although having 25 years experience in plant operation, showed little understanding of the significance of the pasteurization process.

Discussion

After the investigation of the plant had been made, it appeared that in all probability milk contaminated with *Shigella sonnei* was delivered to the plant on October 12, 1952, by some producer and improperly pasteurized. Apparently the contaminated milk was delivered to the schools on October 13 rather than on October 14 and served for lunch the same day. This conclusion is based on the fact that a bottle of milk, presumably delivered on October 14, was found to have been properly pasteurized, and that more evidence showing lack of pasteurization of the milk delivered on October 13 was found.

Although the histories of students who drank milk for lunch on October 14 were tabulated, rather than that for October 13, certain children routinely eat lunch in the cafeterias and drink milk; others routinely eat lunch in the cafeterias and do not drink milk; some children bring lunch to school and drink milk in the

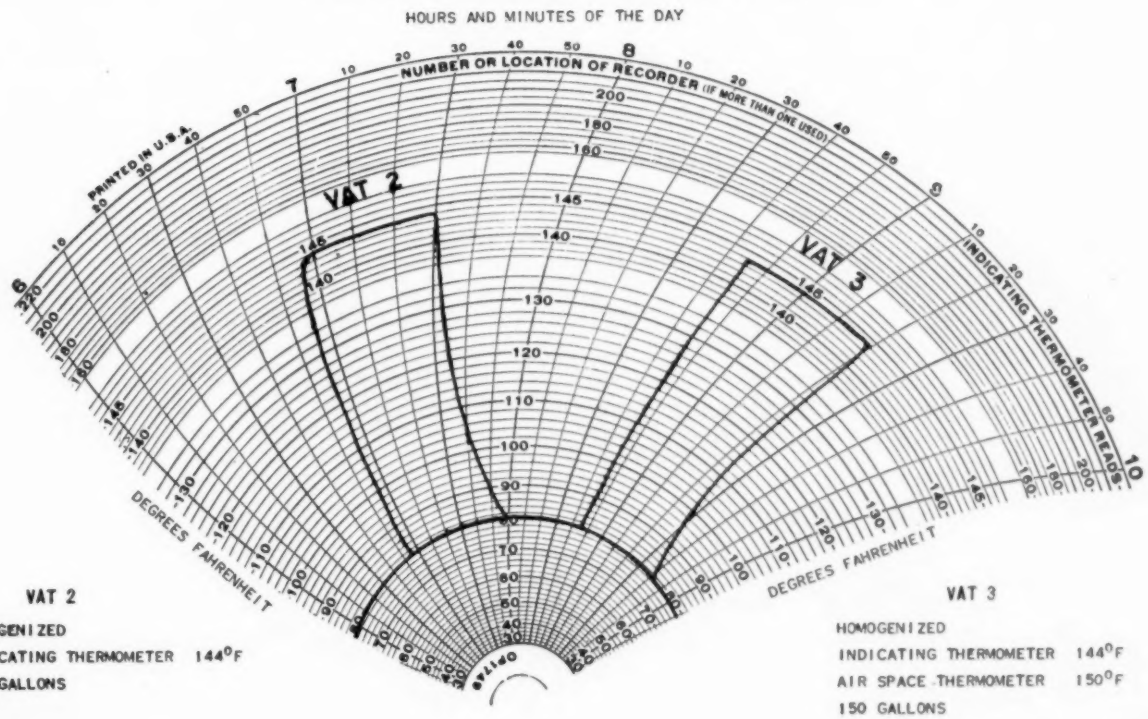
Figure 1. Reproduction of recording thermometer chart for milk pasteurization at the milk plant on October 12, 1952, Madison County, Tenn.


HOURS AND MINUTES OF THE DAY
NUMBER OR LOCATION OF RECORDER (IF MORE THAN ONE USED)
HOURS AND MINUTES OF THE DAY
INDICATING THERMOMETER READS
VAT 2
VAT 3
DEGREES FAHRENHEIT
DEGREES FAHRENHEIT
PRINTED IN U.S.A.

VAT 2
INDICATING THERMOMETER 144°F
AIR SPACE THERMOMETER 150°F
200 GALLONS SWEET MILK
GRADE A

VAT 3
INDICATING THERMOMETER 145°F
AIR SPACE THERMOMETER 150°F
150 GALLONS SWEET MILK
GRADE A

Figure 2. Reproduction of recording thermometer chart for milk pasteurization at the milk plant on October 12, 1952, Madison County, Tenn.



VAT 2
HOMOGENIZED
INDICATING THERMOMETER 144°F
200 GALLONS

VAT 3
HOMOGENIZED
INDICATING THERMOMETER 144°F
AIR SPACE THERMOMETER 150°F
150 GALLONS

Table 3. Shigellosis cases and percentages according to date of onset among students at Parkview School, Madison County, Tenn., October 1952

Date of onset	Number of cases	Percent
Total	155	100. 0
13	1	0. 6
14	17	11. 0
15	26	16. 8
16	37	23. 9
17	32	20. 6
18	20	12. 9
19	10	6. 5
20	9	5. 8
21	3	1. 9

cafeterias; others bring lunch to school and do not drink milk; and some go home for lunch.

Under these circumstances, it would not be expected that the histories of students drinking milk on October 13 would differ significantly from the histories obtained on October 14. In all probability, the evidence of milk being the source would have been stronger if histories of milk drunk on October 13 had been obtained. Where possible, histories of food eaten should cover two or more meals in such investigations.

Although every effort was made to obtain information from the superintendent and others at the plant as to what occurred on October 12, none could be obtained. Since it appears that the charts were faked, most anything could have happened.

In this plant, milk is usually processed each day as it is received from the producer. It is weighed and dumped into conventional receiving equipment. It is then pumped to the vats.

The amount of milk produced on any 1 farm ranged from 20 to 100 gallons. It is reasonable to assume that the milk from only one farm was contaminated. Therefore, not more than 100 gallons of contaminated milk reached the plant. Since the capacity of the vats was 150 and 200 gallons, it is possible that not more than 50 to 100 gallons of uncontaminated milk were mixed with the contaminated milk. Certainly this would have been true if the contaminated milk was the last batch processed on that day. In fact, the contaminated milk may have been processed without having been mixed with other milk.

This investigation presented an opportunity to study the incubation periods of *S. sonnei* infections. The dates of onset for cases occurring in the Parkview School were tabulated (table 3). Although 1 case had an onset approximately 10 hours after lunch was served on October 13, 17 cases had onsets 36 to 48 hours after the probable infection time. The maximum incubation period was 8 days and the median was 3 days.

This outbreak of shigellosis traceable to milk is an example of poor milk sanitation. It illustrates the importance and need for legal authority by the State health department in the operation of milk sanitation programs. In Tennessee, legal responsibility is not vested in the State health department but is a responsibility of an agency primarily interested in milk production. The best milk sanitation program is one where the State health agency has the legal authority for the program with power of delegation of authority to local health agencies. Power of delegation of authority is needed because of the detailed enforcement measures that are required in carrying on a good, uniform milk sanitation program.

ACKNOWLEDGMENTS

Alexander D. Langmuir, M.D., and William H. Clark, M.D., Communicable Disease Center, Public Health Service, visited Jackson after the initial proof had been obtained that milk was the source of the outbreak. They offered suggestions for obtaining additional verification of the source of the infection. The division of laboratories of the Tennessee Department of Public Health isolated and typed the organisms. Staff members of the department and the Madison County Health Department assisted in the collection of data.

Research Activities in Rheumatic Diseases

By JOSEPH J. BUNIM, M.D.

THE RHEUMATIC DISEASES currently subjected to the most intensive investigation in this country are rheumatic fever, rheumatoid arthritis, gout, and the so-called collagen diseases. The following comments are addressed mainly to the first three of these conditions.

During the past year (July 1952 to July 1953) an estimated total of approximately $1,750,000 was contributed in support of research in the rheumatic diseases in this country. Of this amount, 57 percent was advanced by the Federal Government, mostly by the Public Health Service, and the rest (43 percent) by voluntary agencies, universities, foundations, industrial corporations, and private sources combined (figs. 1 and 2).

Rheumatic Fever

The most significant advance made in rheumatic fever as a result of clinical investigation is the demonstration that this disease is preventable. In 1939, it was reported that recurrences of rheumatic fever could be prevented by the continual administration of sulfanilamide to patients who had rheumatic fever. Sulfonamides are effective bacteriostatic agents and suppress the growth of hemolytic streptococci which precede and, it is thought, may incite an attack of rheumatic fever. It was soon discovered, however, that once a streptococcal throat infection developed, administration of sulfonamide was ineffective in preventing the sequel of rheumatic fever. In this regard, penicillin was subsequently found to be decidedly superior to sulfonamides. Although either agent when administered prophylactically to an uninfected person can prevent streptococcal infections and hence recurrences of rheumatic fever, only penicillin can prevent rheumatic fever even when administered after the onset of a hemolytic streptococcal throat infection. This superiority is attributed to bactericidal properties of penicillin in contrast to bacteriostatic action of the sulfonamides. The earlier after onset that penicillin is administered (within 24 hours) the more effective it will be in preventing rheumatic fever.

It is the practice today, therefore, to keep all rheumatic subjects, especially children and adolescents who are most prone to develop recurrences, on daily sulfonamide or penicillin prophylaxis for 5 years or longer following an attack of rheumatic fever and to administer to all patients who develop a hemolytic streptococcal sore throat large doses of penicillin with-

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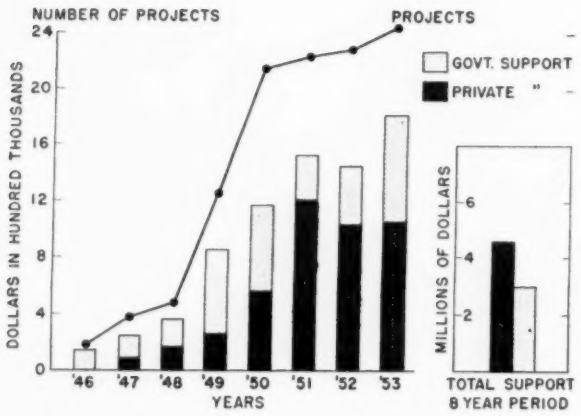
Figure 1. Government and private funds granted for research on rheumatic diseases, 1946–53.



in the first 24 hours of infection. Under such a regimen only 2 percent of known rheumatic subjects will develop recurrences and 0.2 percent of nonrheumatic subjects will develop rheumatic fever. Without these agents the recurrence rate among rheumatic fever subjects following a hemolytic streptococcal infection has been as high as 50 percent.

During the past 2 years, a new repository type of penicillin (Dibenzyl) has been studied. It shows promise of being a useful compound in simplifying effective prophylaxis of rheumatic fever. It now appears that an intramuscular injection of 1,200,000 units once each month will sustain enough concentration of penicillin in the serum and tissues to prevent hemolytic streptococcal infections and even to eliminate the carrier state.

Rheumatoid Arthritis

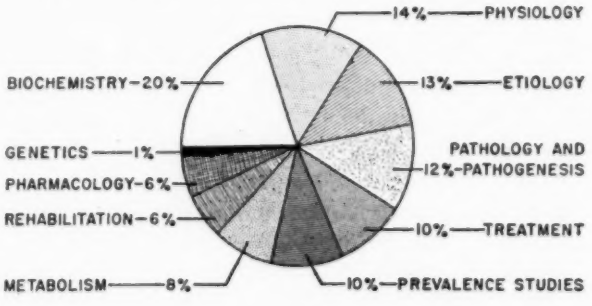
Neither the cause nor the cure of rheumatoid arthritis, the most dreaded of all types of arthritis, is known. Cortisone, hydrocortisone, and corticotropin, when administered to patients who have reversible disease, will very frequently result in dramatic improvement. This may or may not be sustained with prolonged administration. In 80 percent, relapse occurs when the hormone is discontinued. Undesirable effects from this medication are common, and in about 5 to 10 percent they are serious. It is believed that these compounds act by suppressing inflammation. No other adrenal cortical steroid studied thus far has antirheumatic properties. With experience, we have learned to select the proper patients for hormonal therapy more judiciously and to administer these agents more skillfully than in 1949 and 1950.

We are now looking for a steroid whose antirheumatic potency could be enhanced or whose chemical degradation could be inhibited to such a degree as to satisfactorily suppress inflammation of the articular structures and yet produce no undesirable side effects. That this is possible is masterfully exhibited by nature. The pregnant woman with rheumatoid arthritis has a sufficient increase in the steroid concentration of her tissues (as reflected by increased urinary excretion) to experience a striking remission of her arthritis; yet she develops none of the iatrogenic complications seen with prolonged cortisone, hydrocortisone, or corticotropin administration.

The National Institute of Arthritis and Metabolic Diseases of the Public Health Service has made available to responsible investigators in this country radioactive C^{14} cortisone acetate and hydrocortisone. Along with other workers the institute is studying the metabolic fate and physiological disposition of these radioactive steroids.

Phenylbutazone is an effective antirheumatic agent, and, by some mechanism of action which is quite different from the adrenal steroids; it too suppresses inflammation. It also has analgesic properties. Phenylbutazone does not alter the course of rheumatoid arthritis, and when it is discontinued the arthritis relapses. Phenylbutazone cannot be tolerated by approximately 25 percent of the patients. Some of the

Figure 2. Proportion of the arthritis research dollar devoted to different study fields in projects supported by the Public Health Service.



toxic effects are serious, and several deaths apparently resulting from its use have been reported in the American medical literature. Although the mortality rate is a small fraction of 1 percent, nevertheless, many physicians have been discouraged from prescribing phenylbutazone because of these fatalities. It is safe to predict therefore that several derivatives chemically related to this compound will be synthesized and tested with the objective of finding a drug which is free from serious toxic effects and yet retains the desirable antirheumatic properties.

Gold compounds, first introduced in the treatment of rheumatoid arthritis 25 years ago, are still commonly used in this country and Europe. The majority but not all of the experienced clinicians in this field believe that there is considerable merit in gold therapy. Gold may help control the inflammatory phase of the disease. It does not repair damaged cartilage or bone, nor does it free an organically ankylosed or fixed joint. Like cortisone, therefore, it is of value only while the arthritis is active. When gold is discontinued relapse occurs in the majority of cases; therefore, many physicians now maintain their patients on gold therapy for years rather than prescribe interrupted courses. The mode of action of gold is unknown.

Toxicity is severe enough to cause interruption of treatment in 10 to 20 percent of cases. Fatalities today are rare because of greater experience and skill in the administration of this compound, more conservative dosage, and availability of effective agents for combating toxicity, namely, British anti-lewisite (BAL or dimercaprol), cortisone, or corticotropin. There are many patients who can tolerate gold well but who do not benefit from it.

Finally, it is questionable whether gold therapy significantly alters the ultimate clinical course of rheumatoid arthritis even in those patients who derive definite benefit from it during the first few years of treatment. It becomes apparent therefore that gold is not the answer to rheumatoid arthritis. Many physicians believe it is the best available drug; no one will question, however, that it is not an ideal therapeutic agent, hence, the search for a more satisfactory compound is actively in progress today.

Gout

For more than 400 years, colchicine was the only drug known to be of great value in the treatment of gout. In the past 4 years, three important compounds have been accepted as very useful therapeutic agents: corticotropin, phenylbutazone, and probenecid (Benemid).

Although colchicine has the capacity to terminate promptly and dramatically an attack of acute gouty arthritis, it does not increase uric acid excretion nor reduce uric acid level in the blood. In fact, we do not understand how colchicine acts, although it has been used for centuries. Corticotropin can also promptly terminate acute attacks of gouty arthritis. It is superior to colchicine in that the unpleasant gastrointestinal disturbances that appear simultaneously with the therapeutic effect of colchicine do not occur when the corticotropin is used. Although uric acid excretion is increased when this hormone is given, the improvement which follows does not result from this incidental effect.

Phenylbutazone, like corticotropin and colchicine, can terminate an acute attack of gouty arthritis within 24 to 48 hours. It causes a prompt and marked fall in the serum urate level and often but not always a rise in urinary uric acid excretion. Phenylbutazone has certain advantages which makes it more desirable in many cases than either corticotropin or colchicine.

These three drugs are used chiefly to abort acute attacks. For prolonged treatment during the quiescent intervals between attacks probenecid, or Benemid, has been found of definite value in gouty patients who have deposits or uric acid tophi in their tissues. Benemid, which is relatively nontoxic, reduces the level of urates in serum and other extracellular fluid from excessive to normal levels by increasing urinary excretion. The daily increase may be as high as 67 percent over premedication level and is accomplished by specifically blocking reabsorption of urates at the renal tubular epithelium. In some cases, it has been demonstrated that Benemid mobilized long-established tophaceous deposits. Some observers have claimed that prolonged Benemid therapy reduces the frequency of acute attacks of gouty arthritis.

Although these new agents make the outlook for the gouty patient more hopeful, they have not given us an insight into the nature of the intrinsic error in purine metabolism which occurs in gout. At the National Institute of Arthritis and Metabolic Diseases and in a few other centers in this country, studies are in progress on intermediary purine metabolism in gouty and nongouty patients using isotopically labeled glycine and uric acid.

Areas for Research

Important problems that will require thoughtful consideration, careful planning, and sustained scientific pursuit in the immediate future are:

1. To obtain a better understanding of the biochemistry, biophysics, and function of connective tissue which apparently is the primary site of reaction in most of the rheumatic diseases.

2. To elucidate the mechanism of inflammation in these diseases and to develop laboratory methods for satisfactorily screening and evaluating effective anti-inflammatory agents.

3. To determine the role of hypersensitivity or antigen-antibody union in the pathogenesis of certain diseases like rheumatoid arthritis, rheumatic fever, polyarteritis nodosa, and lupus erythematosus.

4. To find a more satisfactory method than is at present available for measuring objectively clinical improvement in arthritis that may result from the administration of a given compound.

5. To collect accurate information on the prevalence and incidence of the various types of arthritis and nonarticular rheumatic disorders in this country.

Characteristics of Needy Aged Persons

A "typical" needy person receiving old-age assistance is a 75-year-old woman living alone in her own home or rooms and taking care of herself. She receives about $14 a month from her children, from social security benefits, or other sources and about $51 a month in old-age assistance, giving her a total income of $65 a month. She will receive old-age assistance for about 7 years.

This description is a composite picture which the Bureau of Public Assistance, Department of Health, Education, and Welfare, formed on the basis of preliminary data from its nationwide study of persons served by the State-Federal old-age assistance programs. The data are based on a statistical sample of the 2.6 million recipients.

Four-fifths of all persons receiving old-age assistance are 70 years of age or older; a fourth are 80 or older, and more than 1,000 are over 100 years old, according to the findings of the study. In spite of their extreme age, 82 percent are able to care for themselves, and less than 4 percent are bedridden.

Most of the old-age assistance recipients (69 percent) are widows, widowers, or single persons, and most of them (60 percent) live outside of metropolitan areas, chiefly in towns of 2,500 or less, on farms, or other rural places. Sixty percent of the recipients are women.

The study also indicates that 59 percent of the needy aged persons live with a relative, that over 25 percent live alone; and that less than 5 percent live in any type of institution or nursing home. Others live with friends, in hotels, or in boarding homes. More than half (54 percent) have been dependent on public assistance for less than 5 years, and only 5 percent have received it for 15 years or longer.

Formal Education in Sanitary Science

By ARTHUR P. MILLER, C.E.

THE ORDER of the sums of money spent on sanitation programs and the number of professional sanitarians engaged in the programs are two indexes of the importance which should be attached to the education of this group of public health workers.

Expenditures by State health departments and other State agencies on identifiable sanitation services in 1950 were $22,413,000 (*1*) or about $0.15 per capita. The amount spent by local health agencies, unofficial health groups, and private interests in the promotion of health by improving or modifying environmental conditions is unknown, but it would increase this figure materially.

The operation of sanitation programs involves the use of different kinds of professional and auxiliary employees. The Report of Local Public Health Resources (*2*) indicates that 3,723 professional sanitarians were employed in 1951 by official health agencies in local areas with full-time health organizations (which cover about one-half the counties and three-fourths of the population in the United States). The report counted as professional sanitarians only those who were professionally trained as public health sanitarians, food technologists, dairy scientists, chemists, entomologists, and for similar vocations. Other sanitation personnel, both of other professions and their auxiliaries, numbered 3,295. Data in this report permit an estimate that 1,056 more professional sanitarians were needed by the local health organizations studied to meet the recommended staffing requirements. The 3,723 professional sanitarians employed added to the 1,056 estimated to be needed total 4,779. This total, like the expenditures total, would be increased, of course, if we were to add the professional sanitarians employed, and those needed to meet a specific staffing pattern, by State health groups working at the State level (as opposed to State-employed workers engaged in health work in local areas) and those of unofficial health organizations and of private interests.

Mr. Miller was acting chief of the former Division of Engineering Resources, Public Health Service, when this paper was written.

Sanitary Science Basic

To accomplish improvement and modification of the environment to the benefit of health at the least cost, sanitarians need a sound and thorough knowledge of sanitary science. Those whose basic education includes instruction in the biological sciences are better prepared to acquire a working knowledge of sanitary science through the process of field training than are others. Chemists, bacteriologists, and entomologists have had the advantage of undergraduate instruction in one or more biological sciences. Similarly, those who have concentrated on sanitary science in their undergraduate studies have received a grounding in the biological sciences. This need will influence

Table 1. Certain characteristics of undergraduate education in sanitary science (sanitation) in the United States, by institution

Institution	Organizational entity having responsibility	Title of		Degree currently awarded	Academic year curriculum initiated
		Curriculum	Option		
California, University of—Berkeley.	School of Public Health	Public health.	Sanitation	B.S.	1946–47
California, University of—Los Angeles.	Department of public health, School of Public Health.	do	do	B.S.	1947–48
Denver, University of.	Division of science, College of Arts and Sciences.	Sanitary science.		B.S.	1948–49
Florida State University.	Department of health education, School of Education.	Sanitation		B.S. (sanitation)	1950–51
Indiana University	Department of public health, School of Medicine.	Public health.		B.S. (public health).	1946–47
Massachusetts, University of.	Department of bacteriology and public health, School of Arts and Sciences.	do		B.S.	1945–46
Michigan, University of.	School of Public Health	Sanitary science.		B.S. in public health.	1950–51
New York University:					
Day division	Department of civil engineering, College of Engineering.	do		B.S. (sanitary science).	1950–51
Evening division [1]	do	do		do	1950–51
North Carolina, University of.	College of Arts and Sciences	Public health.	Physical sciences and public health.	B.S. (public health).	1940–41
Oklahoma, University of.	Department of public health, College of Arts and Sciences.	Public health and sanitation.		B.S.	1949–50
Rutgers University	College of Arts and Sciences	Sanitary science.		B.S. (sanitary science).	1917–18
San Jose State College	Natural science department	Sanitation		B.A. (major in sanitation).	1949–50
Tulane University of Louisiana.	Department of zoology		Sanitarian program.	B.S.	1952–53
Utah State Agriculture College.	Department of bacteriology and public health, School of Arts and Sciences.	Public health major.		B.S.	[2] 1935–36
Washington, State College of.	Department of bacteriology and public health, division of biological sciences, College of Sciences and Arts.		Sanitary science.	B.S. (bacteriology and public health).	1936–37
Washington, University of.	Department of public health and preventive medicine, School of Medicine, College of Arts and Sciences.	Public health.	do	B.S. (major in public health).	1947–48

[1] In this division, this curriculum normally takes more than 4 years to complete.
[2] Estimated.

the pattern of education made available to the future undergraduate student in sanitary science by the colleges and universities electing to engage in this area of education.

Although workers from many professional categories are applying themselves to environmental health problems in this country, the bulk of them are sanitary engineers and sani-

tarians. Considerable information regarding sanitary engineers—their rate of graduation at various degree levels (*3*) and their distribution—is available, but corresponding information has not been available on professional sanitarians whose basic university education was in sanitary science.

The concept selected as the base upon which to obtain relevant data is expressed in a standard definition. Webster defines the sanitarian as "an advocate of sanitary measures; one especially interested or versed in sanitary measures or specifically making a profession of the application of such measures for the public benefit." An advocate of sanitary measures should be well versed in sanitary science and should, therefore, in the process of seeking undergraduate or graduate study, gravitate to institutions prepared to offer the opportunity for major concentration in sanitary science.

Since little has been known about the relationship between undergraduate and graduate instruction in sanitary science, data were collected first for undergraduate work during the early months of 1953 and then for graduate work in June and July 1953. Several professors of sanitary science provided considerable assistance during the course of choosing items

Table 2. Certain characteristics of graduate education in sanitary science (sanitation) in the United States, by institution

Institution	Degrees currently awarded	Organizational entity having responsibility	Academic year in which work was initiated
California, University of—Berkeley.	M.P.H.	School of Public Health	1946–47
Columbia University	M.S. in sanitary science	Division of sanitary science, School of Public Health.	1949–50
Massachusetts, University of	M.S.	Department of bacteriology and public health.	1946–47
Michigan, University of	M.P.H.	School of Public Health	1934–35
	Ph.D. or Sc. D. in sanitary science.	School of Graduate Studies	1948–49
Minnesota, University of [1]	M.P.H.	School of Public Health	1946–47
	M.S.	Graduate School	1946–47
	Ph.D.	do	
New York University	M.S. in sanitary science	Graduate division, College of Engineering.	1947–48
	Ph.D. (sanitary science major).	Graduate division, College of Engineering and Graduate School, College of Arts and Science.	1951–52
North Carolina, University of	M.S.P.H.	Department of sanitary engineering, School of Public Health.	1939–40
	M.P.H.		1947–48
Oklahoma, University of	M.S. in public health	Graduate College and department of public health.	1950–51
	Ph.D.	Graduate College and School of Medicine.	
Puerto Rico, University of	Master in sanitary science	Department of preventive medicine and public health.	1941–42
Rutgers University	M.S.	Department of sanitation, College of Agriculture.	1923–24
	Ph.D.	do	
Tulane University of Louisiana	M.P.H.	Department of tropical medicine and public health, School of Medicine.	1951–52
	Dr.P.H.	do	

[1] Data in this table and table 5 pertain only to sanitation personnel who do not hold a degree in engineering.

to be included in the inquiry and in preparing an inquiry response sheet designed to get the most informative replies.

Inquiries regarding the institutions to be included in the two surveys were made in several directions, and the summaries are believed to be complete (tables 1 and 2). However, some institutions warranting inclusion may not have been addressed. They should be added at a subsequent review of these data.

Course of Study

The distribution of the undergraduate students' time in seven broad instruction groups is shown for each institution in table 3. These groups were selected as being the most suitable for the purposes of this survey. Course subjects were allocated to the groups after consultation with representative teachers of sanitary science, and although there was not complete agreement as a result of the consultations, the weight of opinion favored the following selections:

Natural science and mathematics. Astronomy; chemistry; geology; mathematics; metallurgy; meteorology; physics.

Biological science. Biology; anatomy; bacteriology; microbiology; biochemistry; botany; entomology; genetics; physiology; zoology.

Social science. Anthropology; archaeology; economics; ethnology; geography; history; foreign affairs; political science; psychology; public administration; social work; sociology; statistics.

Engineering. Aeronautical engineering; agricultural, architectural, ceramic, chemical, civil, electrical, general, geological, industrial, mechanical and metallurgical engineering; engineering mechanics and physics; mining, marine, petroleum, sanitary, and textile engineering; naval architecture.

Medical science and health professions. Sanitation; sanitation practice; public health; mental hygiene; epidemiology; nutrition; sanitary (applied) chemistry; public health (specialized) statistics; public health (specialized) administration; public health law.

Humanities. Religion; English and foreign lan-

Table 3. Semester hours required for graduation and distribution of time in 4-year undergraduate sanitary science curriculums in the United States, by institution

Institution	Minimum number semester hours required for graduation	Percent of time allotted to course groups						
		Natural science and mathematics	Biological science	Social science	Engineering	Medical science and health professions	Humanities	Other
California, University of—Berkeley	120	18	14	18	0	38	3	9
California, University of—Los Angeles	128	20. 3	14. 8	25	3. 9	23. 4	6. 3	6. 3
Denver, University of [1]	124	22. 2	25	19. 4	3. 4	22. 2	5. 5	1. 6
Florida State University	124	19	27	13	0	14	17	10
Indiana University	124	19. 38	15. 5	13. 18	1. 55	24. 81	10. 85	14. 73
Massachusetts, University of	120	15	28	10	7	20	15	5
Michigan, University of	130	27	16	13	6	29	9	0
New York University:								
Day division	150	27. 3	9. 3	10. 7	25. 3	8. 7	13. 4	5. 3
Evening division	142	28. 9	9. 8	11. 2	26. 8	9. 2	14. 1	0
North Carolina, University of	135	32	11	13	15	11. 5	15	2. 5
Oklahoma, University of	123	20	20	13	6	25	11	5
Rutgers University [2]	147	26. 52	32. 64	8. 16	0	4. 08	20. 4	8. 16
San Jose State College	124	23	21	24	5	16	9	2
Tulane University of Louisiana	146	25	27	15	0	12	16	5
Utah State Agricultural College [3]	124	12. 36	23. 11	5. 38	0	19. 89	10. 21	29. 05
Washington, State College of	128	20	25	10	8	25	5	7
Washington, University of [4]	142	22	11	10	7	23	4	23

[1] Percentage of time allotted totals 99.3.
[2] Percentage of time allotted totals 99.96.
[3 4] Percentages of time allotted are not comparable to the others because the figure for "Other" includes 25.82 percent and 14 percent, respectively, of "electives."

Table 4. Number of graduates from undergraduate sanitary science (sanitation) curriculums in the United States, 1931–53

Institution	Total	Academic year [1]								
		1931	1933	1936	1937	1938	1939	1940	1941	1943
Total	474	0	1	0	1	6	7	8	3	4
California, University of—Berkeley	90	----	----	----	----	----	----	----	----	----
California, University of—Los Angeles	89	----	----	----	----	----	----	----	----	----
Denver, University of	65	----	----	----	----	----	----	----	----	----
Florida State University	3	----	----	----	----	----	----	----	----	----
Indiana University	36	----	----	----	----	----	----	----	----	----
Massachusetts, University of	44	----	----	----	----	----	----	----	----	----
Michigan, University of	5	----	----	----	----	----	----	----	----	----
New York University	0	----	----	----	----	----	----	----	----	----
North Carolina, University of	5	----	----	----	----	----	----	----	0	2
Oklahoma, University of	18	----	----	----	----	----	----	----	----	----
Rutgers University [2]	18	0	1	0	0	1	3	2	1	2
San Jose State College	14	----	----	----	----	----	----	----	----	----
Tulane University of Louisiana	0	----	----	----	----	----	----	----	----	----
Utah State Agricultural College	[4] 23	----	----	[3] 0	[3] 1	[3] 2	2	3	[3] 1	0
Washington, State College of	42	----	----	----	0	[3] 3	[3] 2	[3] 3	[3] 1	0
Washington, University of	[4] 22	----	----	----	----	----	----	----	----	----

Institution	Academic year [1]									
	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
Total	2	1	1	3	19	53	101	100	87	77
California, University of—Berkeley	----	----	----	0	5	5	20	22	23	15
California, University of—Los Angeles	----	----	----	----	4	11	13	23	17	21
Denver, University of	----	----	----	----	----	14	19	21	7	4
Florida State University	----	----	----	----	----	----	----	1	0	2
Indiana University	----	----	----	0	0	5	6	7	10	8
Massachusetts, University of	----	----	0	0	0	7	18	7	6	6
Michigan, University of	----	----	----	----	----	----	----	0	1	4
New York University	----	----	----	----	----	----	----	0	0	0
North Carolina, University of	1	1	0	0	0	1	0	0	0	0
Oklahoma, University of	----	----	----	----	----	----	3	5	6	4
Rutgers University [2]	1	0	0	0	1	1	4	0	1	0
San Jose State College	----	----	----	----	----	----	4	4	4	2
Tulane University of Louisiana	----	----	----	----	----	----	----	----	----	0
Utah State Agricultural College	0	0	[3] 0	[3] 2	[3] 2	1	[4] 4	1	2	2
Washington, State College of	0	0	1	1	5	4	6	5	6	5
Washington, University of	----	----	----	----	2	4	4	4	4	[4] 4

[1] The academic year is defined as the 12-month period prior to the close of the spring session, which is in June at most colleges and universities. No degrees were awarded in the years omitted from the table.

[2] Figures for the academic years 1917–18 through 1929–30 are not available, but it has been estimated by T. J. Murray that there was about one graduate per year during that 13-year period. These estimated figures have not been included in the totals.

[3] Estimated.

[4] Includes 1 non-United States national.

guages; journalism; literature; architecture; music; speech and dramatic arts; philosophy.

Other. Military science; physical education.

Table 4 shows that 15 colleges and universities have had 474 graduates from undergraduate sanitary science curriculums in the 23-year period covered. Of these graduates, 418, or 88 percent, finished their work in the last 5 years (1949–53).

A total of 425 completed graduate work in sanitary science in the 28 years reported upon. Of these 407 were at the master's level (table 5).

Table 5. Number of graduates from graduate sanitary science (sanitation) courses in the United States, 1926–53

Academic year [1]	Master's degree level												Doctor's degree level
	Total	California, University of	Columbia University	Massachusetts, University of	Michigan, University of	Minnesota, University of	New York University	North Carolina, University of	Oklahoma, University of	Puerto Rico, University of	Rutgers University	Tulane University of Louisiana	Rutgers University
Total	407	33	[2] 17	51	78	11	13	68	24	70	[3] 37	5	18
1926	1										1		0
1928	0										0		1
1929	2										2		0
1930	1										1		0
1932	1										1		1
1933	3										[3] 3		0
1935	3				1						2		1
1936	2				1						1		0
1937	2				1						1		0
1938	5				5						0		1
1939	6				5						1		3
1940	7				7			0			0		0
1941	8				6			1			1		0
1942	15				3			3		9	0		0
1943	1				1			0		0	0		0
1944	12				0			0		11	1		0
1945	20				0			1		18	[4] 1		0
1946	10				0			0		9	1		0
1947	22	2			0	1		6		12	1		0
1948	12	0			1	1	0	8		0	2		1
1949	24	3		2	6	0	4	8		0	1		1
1950	53	7	[3] 5	10	6	1	3	11		0	10		2
1951	75	6	([5])	14	14	3	2	16	8	11	1		2
1952	70	7	[6] 7	16	10	2	0	12	9	0	3	4	2
1953	52	8	[3] 5	9	11	3	4	2	7	([5])	2	1	3

[1] The academic year is defined as the 12-month period prior to the close of the spring session, which is in June at most colleges and universities. No degrees were awarded in the years omitted from the table.
[2] Includes 4 non-United States nationals.
[3] Includes 1 non-United States national.
[4] Includes 1 woman.
[5] Curriculum not offered this academic year.
[6] Includes 2 non-United States nationals, 1 of whom is a woman.

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Preliminary Report, Advisory Committee On Weather Control

A TWO-YEAR STUDY of weather control was initiated August 13, 1953, by the 83d Congress as Public Law 256. The law established the Advisory Committee on Weather Control, consisting of 5 civilian members and 6 Government members. The Government representatives are from the Departments of Defense, Interior, Agriculture, Commerce, the National Science Foundation, and the Department of Health, Education, and Welfare.

At the committee's first meeting December 18, 1953, at the Department of the Interior, Washington, D. C., it was proposed that the study be divided into two periods of a year each. The first year will be devoted to determining the effectiveness of weather modification procedures by studying and evaluating past and present experience in weather control. The second year would be concerned with a continuation of such studies and the determination of the extent to which the Government should experiment with, engage in, or regulate weather control activities. Recommendations on the latter cannot be made until some positive conclusions have been made on the practicability of weather control.

The statement of purpose and policy of the law reads that application of scientific advances in this field appears to be practical at this time and:

"While the ultimate extent to which weather modification and control may be utilized is speculative, the application of such measures without proper safeguards, sufficient data, and accurate information may result in inadequate or excessive precipitation; may cause catastrophic droughts, storms, floods, and other phenomena with consequent loss of life and property, injury to navigable streams and other channels of interstate and foreign commerce, injury to water supplies for municipal, irrigation, and industrial purposes, and injury to sources of hydroelectric power; may otherwise impede the production and transportation of goods and services for domestic consumption and export and for the national defense; and may otherwise adversely affect the general welfare and common defense.

"Thorough experimentation and full-scale operations in weather modification and control will of necessity affect areas extending across State and possibly across national boundaries. The Congress, therefore, recognizes that experimentation and application of such measures are matters of national and international concern.

"Accordingly, it is hereby declared to be the policy of the Congress, in order to effect the maximum benefit which may result from experiments and operations designed to modify and control weather, to correlate and evaluate the information derived from such activity and to cooperate with the several States and the duly authorized officials thereof with respect to such activity, all to the end of encouraging the intelligent experimentation and the beneficial development of weather modification and control, preventing its harmful and indiscriminate exercise, and fostering sound economic conditions in the public interest."

The law also provides that: "Information obtained under this act which the committee deems confidential for purposes of national security or other reasons or with reference to which a request for confidential treatment is made by the person or agency furnishing such information, shall not be published or disclosed unless the committee determines that the withholding thereof is contrary to the purposes of

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This material was prepared by the Division of Sanitary Engineering Services, Bureau of State Services.

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this act, and any member or employee of the committee willfully violating this provision shall, upon conviction, be fined not more than $5,000."

Surgeon General Leonard A. Scheele is the member from the Department of Health, Education, and Welfare, and John H. Ludwig, senior sanitary engineer, Division of Sanitary Engineering Services, will serve as alternate.

Weather Control and Public Health

The Public Health Service interest relates to changes in environment associated with any appreciable modification in precipitation caused by weather control measures. Specifically these changes are: any increase or decrease in the water supply for domestic, municipal, and industrial use; any increase or decrease in the availability of water for absorbing liquid waste effluents through the process of dilution, that is, for pollution control; environmental changes affecting the growth and reproduction of insects capable of transmitting diseases; and provision for health services in time of flood or other natural disaster.

In some areas the water supply is fast becoming the limiting factor in urban growth. Present concern is with the water-shortage areas of the southwest United States. However, there are indications that the eastern States are becoming apprehensive over competitive demands for water and are re-evaluating water resources policy to assure maximum use of our limited water supplies. Controlled increase of rainfall in any substantial quantity would be a boon to present water-shortage areas, and the entire country could benefit to some degree.

Similarly, the potential control of rainfall could do much to assure adequate minimum flow in our streams. The minimum, or dry-weather, flow of a stream is generally the critical factor which limits its capacity for absorbing liquid waste effluents without deleterious effects. Augmentation of low flows would provide the necessary dilution for properly treated sanitary sewages and industrial wastes, thus assuring protection for other legitimate water uses. Increased rainfall as an aid in the solution of pollution problems would be nationwide in application.

Modification of climate through weather control would have profound effects on present insect balances in this country, and would require continuous study and investigation to prevent increases in existing insectborne diseases, reestablishment of insectborne diseases which have been essentially eradicated, and introduction of exotic diseases and vectors resulting from the establishment of climates favorable to such species.

The application of weather modification without proper safeguards may result in excessive rainfall, catastrophic storms and floods with consequent loss of life and property, injury to water supply, sewerage, refuse disposal, and other facilities and services essential to health. The Public Health Service is charged with the responsibility of controlling communicable diseases during such periods by lending emergency assistance that may be requested by State health departments and through the departments, to individual communities.

Study Principles

The committee, while still in the formative stage, issued a statement listing several principles which will guide the study.

"First, the committee will base its conclusions on facts obtained and interpreted and not on any preconceived notions. Experiments to date have suggested that weather control may eventually provide benefits to agriculture, industry, and government. Without such a hint of substantial benefits, the Congress would most likely not have created this committee. However, the committee will not now proceed under the assumption that weather control, including rainmaking, does 'work' or does not 'work.' It will aim to examine all of the evidence with scholarly care and scientific impartiality.

"Second, the committee recognizes the need for additional basic research dealing with processes related to rain, snow, and cloud phenomena. There is also a need to develop ways and means of providing methods for reliable evaluation of weather control activities. The committee will encourage such research in industry, at our universities, and throughout government.

"Third, the committee will welcome, and will solicit, the information possessed by and the

opinions held by all individuals and groups having an interest in the field of weather control. It will carefully consider all facts and opinions pertinent to its study.

"Fourth, the committee will not act in any way prejudicial to responsible individuals and concerns attempting to modify the weather."

Committee Members

The civilian members of the committee are: Chairman Howard T. Orville, Capt. USN (Ret.), technical consultant, Bendix Aviation Corporation, Baltimore, Md.; Vice Chairman A. M. Eberle, dean of agriculture, South Dakota State College of Agriculture and Mechanic Arts, Brookings; Lewis W. Douglas, Sonoita, Ariz., chairman of the board, Mutual Life Insurance Co., New York; Joseph J. George, Brig. Gen. USAFR, superintendent of meteorology, Eastern Airlines, Atlanta, Ga.; Kenneth C. Spengler, executive secretary, American Meteorological Society, Boston, Mass.

The Government members besides Dr. Scheele and his alternate, Mr. Ludwig, are: Donald A. Quarles, Assistant Secretary for Defense for Research Development, and his alternate, Earl Droessler, head of Committee on Geophysics and Geography in Mr. Quarles' office; Ralph A. Tudor, Under Secretary of the Interior, whose alternate is Dr. Luna B. Leopold, Water Resources Division, United States Geological Survey; J. Earl Coke, Assistant Secretary of Agriculture, with Dr. Byron T. Shaw, agricultural research administrator, his alternate; Robert B. Murray, Under Secretary of Commerce for Transportation, and his alternate, Dr. F. W. Reichelderfer, chief, United States Weather Bureau; Dr. Alan T. Waterman, Director, National Science Foundation, and Dr. Paul E. Klopsteg, associate director, his alternate.

Grants to Aid Careers in Medical Technology

Grants of $30,000 from the American Cancer Society and $15,000 from the National Cancer Institute, Public Health Service, were received recently by the National Committee for Careers in Medical Technology. The grants are to be used in a program to recruit young people into the profession of medical technology.

The committee is sponsored by the American Society of Medical Technologists, the American Society of Clinical Pathologists, and the College of American Pathologists.

Although nearly 20,000 medical technologists are registered with the Board of Registry of the American Society of Clinical Pathologists, it is estimated that a total of 70,000 technologists can be used.

The American Cancer Society grant will be used to produce a 20-minute color movie for classrooms and group meetings and a 13-minute black and white film for television. The National Cancer Institute grant will purchase prints of the films for use by schools and educational guidance groups, science and other clubs, rural audiences such as the 4–H clubs, and television outlets.

Waterborne Fluorides and Mortality

By THOMAS L. HAGAN, D.D.S., M.P.H., MORTON PASTERNACK, and GRACE C. SCHOLZ

CAREFUL ANALYSIS of specific mortality data from communities with fluoride-free and fluoride-bearing water supplies will provide indirect evidence about the relationship between the prevalence of certain diseases and exposure to trace amounts of fluoride. A study was therefore designed to examine the relationship between mortality from heart diseases, cancer, intracranial lesions, nephritis, and cirrhosis of the liver in communities with and without fluoride in their drinking water. The first four of these diseases are listed among the leading causes of death in the United States.

Similar studies have been done in the past but were confined to limited geographic areas (*1*, *2*). They failed to show a difference in mortality between cities using fluoride and those using nonfluoride water supplies. Following one such study (*1*), the State health department publication stated, ". . . it is highly improbable that local physicians in these [fluoride] areas would not be sharply aware of these conditions and highly voluble in making the situation known." Now, however, in view of the widespread interest in water fluoridation, it seems of value to go even further in analyzing and presenting pertinent data from fluoride and nearby nonfluoride communities in the United States for which water fluoride analyses are available.

Dr. Hagan is chief and Miss Scholz, statistician, Division of Dental Public Health, Bureau of State Services, Public Health Service. Mr. Pasternack, a statistician formerly with the division, is now with the Air Defense Command, Air Force Base, Colorado Springs, Colo.

Materials and Methods

The plan of this study is to compare the mortality experience of 32 pairs of fluoride and nonfluoride cities (fig. 1). A community is classified as a "fluoride city" when the majority of the analyses of its water supply indicate the presence of fluoride in concentrations of 0.70 p.p.m. or more. Conversely, a city is classified as "nonfluoride" when, according to these reports, its water supply contains 0.25 p.p.m. or less (*3–17*). Cities, with a population of 10,000 or more, according to the 1950 census, were included in this study (*18*). The total population considered in this study is 892,625 persons in fluoride cities and 1,297,500 in nonfluoride cities.

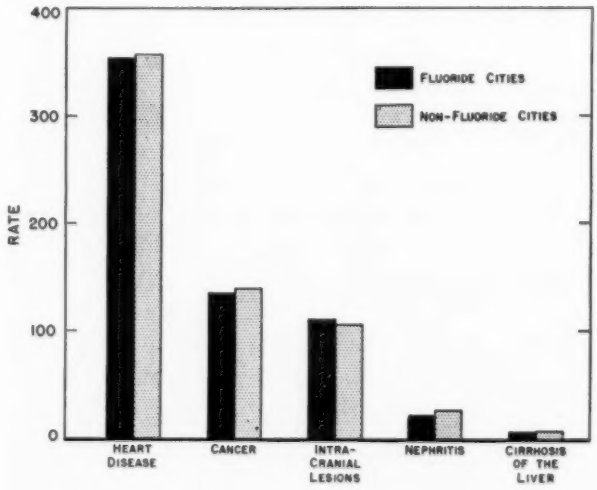
After the States and the fluoride cities within each State were arrayed alphabetically, each fluoride city in order was paired with the nearest nonfluoride city not previously paired. An exception to this method of pairing was required in Texas and New Mexico because fluoride cities outnumber nonfluoride cities. The eight nonfluoride cities were arrayed alphabetically and paired with the nearest fluoride city. Each city was used only in one comparison. Therefore, 13 fluoride cities in Texas and 3 in New Mexico were not included because no nearby nonfluoride cities were available.

Mortality rates for each city were based on an average of the number of deaths occurring in 1949 and in 1950 wherever data for both years were available (*19*). The use of 2-

Figure 1. Location of the 32 paired fluoride and nonfluoride cities in 16 States of the United States.

year average rates tends to reduce sampling variation in the analysis of vital data of this type (*20*). Mortality data of 1949 were not available for cities whose population passed the 10,000 mark during the decade 1940–49. Hence, only the number of deaths for 1950 were used in these instances. The rates were adjusted for age, race, and sex by the indirect method, using the 1950 United States population as a standard (*21*).

Figure 2. Deaths from selected causes in 32 paired fluoride and nonfluoride cities in 16 States of the United States.



The population of State chronic disease hospitals was deducted from the city population in each instance in which the number of patients in such hospitals exceeded 1 percent of the population of the city concerned. This procedure was followed because the National Office of Vital Statistics allocates death in these institutions to the city of residence of the deceased and inclusion of the institutional population would bias the data for certain communities (*22, 23*).

Findings

Table 1 shows mortality rates for all causes and for the selected causes of death. Thirty-two pairs of all causes and disease-specific mortality rates have been arrayed, each pair com-

Table I. Adjusted mortality rates for all causes and for selected causes per 100,000 population in 32 paired fluoride and nonfluoride cities in the United States, 1949–50

Paired fluoride and nonfluoride cities	Heart disease (410–443)[1]	Cancer (140–205)[1]	Intracranial lesions (330–334)[1]	Nephritis (590–594)[1]	Cirrhosis of liver (581)[1]	All causes
Average:[2]						
Fluoride	354.8	135.4	111.5	21.9	6.6	1,010.6
Nonfluoride	357.4	139.1	104.8	26.7	8.2	1,005.0
Fluoride: Colorado Springs, Colo.[3]	340.5	151.8	87.2	15.7	8.4	1,034.1
Nonfluoride: Aurora, Colo	350.4	99.9	21.0	0.0	14.6	912.8
Fluoride: Englewood, Colo.[4]	410.9	148.2	94.3	13.8	12.4	1,185.5
Nonfluoride: Boulder, Colo	322.0	151.1	91.1	9.6	5.3	971.1
Fluoride: Jacksonville, Fla.[4]	338.6	148.3	136.9	23.2	11.8	1,139.0
Nonfluoride: St. Augustine, Fla	397.8	135.3	117.2	15.3	0.0	1,155.6
Fluoride: Moultrie, Ga.[4]	435.2	123.5	176.7	38.6	0.0	1,226.1
Nonfluoride: Tallahassee, Fla	313.2	98.3	111.5	22.4	7.8	900.7
Fluoride: Nampa, Idaho[4]	314.2	109.8	120.6	31.4	9.0	888.8
Nonfluoride: Pendleton, Oreg	405.9	172.5	105.9	20.3	0.0	1,164.3
Fluoride: Aurora, Ill.[4]	374.9	160.5	118.1	25.7	6.8	1,028.4
Nonfluoride: Downers Grove, Ill	359.6	174.4	87.3	20.6	0.0	1,042.3
Fluoride: East Moline, Ill.[4]	343.4	122.4	109.8	28.9	8.2	969.6
Nonfluoride: Moline, Ill	361.6	151.5	95.6	14.3	10.2	974.0
Fluoride: Elmhurst, Ill.[3]	333.1	143.0	69.6	17.4	6.6	846.5
Nonfluoride: Melrose Park, Ill	515.4	169.1	117.8	49.5	20.9	1,181.8
Fluoride: Galesburg, Ill.[3]	408.6	130.3	127.4	13.2	8.0	1,013.7
Nonfluoride: Rock Island, Ill	374.2	139.4	104.2	16.6	12.0	1,024.2
Fluoride: Joliet, Ill.[4]	458.6	178.4	110.3	29.1	15.0	1,241.6
Nonfluoride: Blue Island, Ill	452.8	159.0	93.1	38.7	10.6	1,105.2
Fluoride: Kewanee, Ill.[4]	322.6	175.2	120.6	55.0	7.3	1,028.4
Nonfluoride: Davenport, Iowa	339.4	146.0	121.4	21.1	6.6	978.8
Fluoride: Monmouth, Ill.[5]	412.8	188.1	125.2	0.0	0.0	1,067.0
Nonfluoride: Burlington, Iowa	335.3	121.0	134.9	33.5	8.4	967.6
Fluoride: Frankfort, Ind.[4]	356.0	133.1	135.1	9.4	0.0	1,048.9
Nonfluoride: Lafayette, Ind	362.8	157.3	143.8	11.0	16.5	1,038.8
Fluoride: Charles City, Iowa[4]	378.7	169.4	139.9	9.1	0.0	995.7
Nonfluoride: Waterloo, Iowa	310.2	97.1	125.6	20.9	5.3	848.4
Fluoride: Garden City, Kans.[4]	353.6	83.2	73.8	44.5	0.0	1,006.7
Nonfluoride: Salina, Kans	287.6	143.8	113.5	33.7	9.2	975.4
Fluoride: Cambridge, Md.[4]	469.6	169.8	129.2	17.1	0.0	1,182.3
Nonfluoride: Salisbury, Md	461.7	128.5	150.2	45.8	12.9	1,167.7

prising the rates for a fluoride city and the rates for a nearby nonfluoride city.

The average mortality rate for all causes of death was 1,005.0 per 100,000 population in nonfluoride cities and 1,010.6 in fluoride cities. In 16 pairs the rate was higher in nonfluoride cities, and for 16 pairs it was higher in the fluoride cities. There is no statistically significant difference between the mortality rates for all causes of death in flouride and nonfluoride cities. The significance of the differences was determined from the differences between the pairs.

This similarity of mortality experience is true for the five causes of death selected for study (fig. 2). The mortality rate from heart diseases for all nonfluoride cities was 357.4 per 100,000 population as compared with 354.8 per 100,000 in fluoride cities. In 17 of the comparisons the rate was higher in the nonfluoride cities; in 15 pairs the rate was higher in the fluoride cities.

Cancer deaths occurred at the rate of 139.1 per 100,000 population in nonfluoride cities and 135.4 per 100,000 in fluoride cities. In half of the 32 pairs the rates were lower in the fluoride cities.

Intracranial lesions were the cause of death in 104.8 per 100,000 population in nonfluoride cities and 111.5 in fluoride cities, with the rate higher in nonfluoride cities for 13 of the 32 pairs.

The nephritis death rate was 26.7 per 100,000 in the nonfluoride cities and 21.9 in the fluoride cities. In 19 pairs the rates were higher in the nonfluoride cities.

Table I. Adjusted mortality rates for all causes and for selected causes per 100,000 population in 32 paired fluoride and nonfluoride cities in the United States, 1940–50—Continued

Paired fluoride and nonfluoride cities	Heart disease (410–443)[1]	Cancer (140–205)[1]	Intra cranial lesions (330–334)[1]	Nephritis (590–594)[1]	Cirrhosis of liver (581)[1]	All causes
Fluoride: Columbia, Mo.[4]	241.1	96.6	130.9	33.6	4.4	817.7
Nonfluoride: Moberly, Mo	307.9	128.6	82.1	33.1	2.8	950.6
Fluoride: Fulton, Mo.[4]	390.7	111.6	94.9	21.6	0.0	1,106.7
Nonfluoride: Hannibal, Mo	431.7	125.2	115.0	38.9	8.2	1,104.6
Fluoride: Mexico, Mo.[4]	362.2	154.9	40.3	27.8	0.0	941.3
Nonfluoride: Quincy, Ill	423.9	147.8	127.5	29.1	5.9	1,090.6
Fluoride: Great Falls, Mont.[4]	341.9	161.3	80.7	21.2	19.6	1,016.8
Nonfluoride: Helena, Mont	416.1	140.5	92.6	44.5	13.2	1,055.6
Fluoride: Bowling Green, Ohio[4]	325.2	101.2	147.7	9.6	10.2	906.7
Nonfluoride: Findley, Ohio	336.0	148.6	101.6	17.7	5.4	937.3
Fluoride: Van Wert, Ohio[3]	331.8	88.2	33.8	40.3	8.3	787.8
Nonfluoride: Fort Wayne, Ind	370.5	160.6	113.2	25.1	9.0	1,046.6
Fluoride: Texas City, Tex.[4]	399.1	83.8	91.4	0.0	19.2	923.1
Nonfluoride: Beaumont, Tex	331.7	139.1	82.7	29.0	9.5	968.4
Fluoride: Grand Prairie, Tex.[3]	342.0	145.1	82.4	13.2	11.0	925.9
Nonfluoride: Fort Worth, Tex	344.0	138.9	107.5	18.2	9.6	976.5
Fluoride: McKinney, Tex.[4]	454.3	137.4	128.5	31.6	0.0	1,235.6
Nonfluoride: Greenville, Tex	323.4	136.2	105.4	30.2	12.3	1,025.4
Fluoride: Corsicana, Tex.[4]	255.1	98.5	134.9	22.9	0.0	962.4
Nonfluoride: Palestine, Tex	390.3	141.4	68.5	58.1	11.1	1,032.1
Fluoride: Snyder, Tex.[4]	240.5	120.3	91.6	14.0	0.0	887.8
Nonfluoride: Sweetwater, Tex	314.9	125.5	97.5	24.1	4.2	1,095.0
Fluoride: Sherman, Tex.[4]	363.5	154.4	113.4	15.5	9.7	979.4
Nonfluoride: Texarkana, Tex	346.6	148.9	136.3	32.0	8.6	1,023.3
Fluoride: Waxahachie, Tex.[3]	323.7	147.7	130.3	34.0	9.1	976.2
Nonfluoride: Tyler, Tex	321.9	103.3	108.7	17.5	7.5	837.8
Fluoride: Cleburne, Tex.[4]	304.1	133.0	138.0	6.3	3.3	966.8
Nonfluoride: Waco, Tex	301.9	129.4	90.6	16.7	6.8	913.3
Fluoride: Green Bay, Wis.[3]	299.2	123.2	123.4	18.9	9.5	946.7
Nonfluoride: Two Rivers, Wis	311.5	167.2	114.6	39.2	4.6	923.7
Fluoride: Cheyenne, Wyo.[4]	327.8	140.8	130.3	19.7	14.1	1,057.6
Nonfluoride: Fort Collins, Colo	213.6	127.1	75.6	27.7	3.0	770.6

[1] Code numbers from the Sixth Revision of the International List of Causes of Death.
[2] Average of the 32 respective averages for fluoride and nonfluoride cities listed below.
[3] Cities in which fluoride content ranges from 1.4–2.5 p.p.m.
[4] Cities in which fluoride content ranges from 0.7–1.3 p.p.m.
[5] Cities in which fluoride content ranges from 2.6–4.0 p.p.m.

For cirrhosis of the liver the mortality rate per 100,000 population was 8.2 for nonfluoride cities and 6.6 for fluoride cities and the rates were higher for nonfluoride cities in 17 pairs.

Summary

1. This report presents an analysis of mortality from all causes and from five selected causes—heart disease, cancer, intracranial lesions, nephritis, and cirrhosis of the liver—in 64 cities in 16 States, and compares rates in those cities in which water analyses show the fluoride content to be 0.25 p.p.m. or less with those cities where the fluoride content is 0.70 p.p.m. or more.

2. These data show no statistically significant difference between the mortality rates of fluoride and nonfluoride cities for all causes or for heart disease, cancer, intracranial lesions, nephritis, or cirrhosis of the liver.

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Better Care for Older People

By LEONARD A. SCHEELE, M.D.

WHEN PEOPLE with common responsibilities and common problems get together at a "brass-tacks" meeting of this sort with the intention of finding out how they can put sound principles into practice, we really get down to immediate details of practical importance. It is then that we begin to feel the forward thrust of movement toward a common objective.

This regional conference—the first of three to be held by the National Committee on the Aging—meets the requirements of a "brass-tacks" meeting. The 2-year study on Standards of Care for Older People in Institutions, conducted by the committee under the able direction of Mrs. Edith Alt, is based on the experience of hundreds of organizations, institutions, individual experts, and older people themselves. Out of these experiences and collected facts, the study has drawn some basic principles—in a field of service so new that there were very few guides to the formulation of principles. Now the time has come to test the principles in the fire of new experience; specifically, in the future action of responsible officials and operators of institutions for older people; in the decisions of boards of trustees and other policymakers; and in the action of religious, voluntary, and professional groups. This new experience will be further judged by other citizens—the older people themselves, their families and friends, and the large group we call the "whole community."

There are more than 4 million men and women, 65 years of age and over, in the 13 States and the District of Columbia, which you represent at this conference. This means that what you decide here over the weekend and what you do at home next week and the months ahead will affect profoundly the health and happiness of more than one-third of the Nation's older people. That is a sobering thought. So let us first consider the health of older people in homes for the aged and in nursing homes.

Dr. Scheele, Surgeon General of the Public Health Service, presented this address at the Regional Conference on Methods of Establishing and Maintaining Standards in Institutions for Older People, sponsored by the National Committee on the Aging of the National Social Welfare Assembly, in Washington, D. C., February 1954. Represented at the conference were the 13 States, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, and Virginia, and the District of Columbia.

The Problem as We See It

The need for facilities of this type has grown—and is growing rapidly. To supply the need is a problem which, like old age itself, has crept up on us—on the Nation, on our communities, and on the old people and their families. Probably no two groups represented at this conference will view the problem in precisely the same way. I am sure, however, that we all

agree it must be solved in such ways as will protect and promote the health of all older people.

We cannot do justice to one of the major issues of our generation if we approach the problem of better care for older people in institutions narrowly. We must relate our thinking about institutional care to the entire spectrum of physical, mental, social, and economic factors that make up the total problem of aging.

Health is at the heart of every aspect of aging. Every study that has been made in the past 25 years bears out this viewpoint. The more recent data underscore the findings of a generation ago—and show that the burden of ill health among the elderly has increased in volume. It will continue to do so.

Older people get sick more often and their illnesses are more frequently disabling and last longer. Most of you would confirm that statement on the basis of your daily experience—whether you are a physician, social case worker, public health nurse, welfare administrator, or manager of a nursing home.

In planning for the better care of older people, however, it is important for us to realize that chronic "degenerative" diseases occur four times as frequently among the old-age group as in the general population. Long-term illness, disabling 30 days or longer, occurs twice as frequently among the elderly and the average period of disability due to chronic illness is more than four times as long for the older person as for the average person in the general population.

Diseases of the heart, blood vessels, and kidneys account for nearly one-third of the disabling illnesses among older people. Arthritis, tuberculosis, other diseases of the bones and joints, accidents, diabetes, cancer, and eye diseases make up the remaining major causes of long-term, disabling illness among the elderly. Nevertheless, we find in the same old-age groups high case rates for such acute ailments as bronchitis, influenza, pneumonia, and diarrhea.

Findings from the survey in the Eastern Health District of Baltimore, covering the 5-year period 1938–43, also reveal significant differences in the sickness experience of the two sexes. Older women, for example, are more frequently confined to bed than are older men, but on the average, the total days in bed are fewer for the women.

Disabling home accidents occur among older people three times as frequently as in the general population. Among older women, however, the disability rate is more than double that among older men and is nearly five times that in the general population.

These findings bring into sharp focus the relationship of health to the total problem of aging. It is true that we can confidently expect advances in medical science with respect to the diagnosis and treatment of the major causes of disability in the general population and in the older age-groups. Physicians undoubtedly will be able to deal more effectively with many of the disabilities of old age. Nevertheless, the disabilities must be dealt with in individual patients, whose numbers will increase.

Parallel with the anticipated increase in numbers of older people, we can expect increased demands for physicians' services, hospital care, and nursing services. The aging of the population also means an increasing concentration of such services on the chronic diseases. Only by increased efforts to prevent chronic diseases or modify their disabling effects will we able to reduce significantly the burden they impose upon our medical and hospital resources and on the total national economy.

We do not have adequate estimates of the number of elderly patients hospitalized annually in our general hospitals, nor of the number hospitalized for chronic disease. The American Hospital Association, however, estimates that from one-fourth to one-half of the annual days of hospitalization provided in general hospitals is for chronic diseases. In view of the higher rates of chronic disease in the old-age group, it is safe to assume that a considerable share of those days is devoted to older people.

Some significant figures have been issued recently by the Public Health Service's National Institute of Mental Health regarding older people in State mental hospitals. The rate of admissions for persons over 65 has increased from 148 per 100,000 population in 1933 to 225 per 100,000 in 1948. Mental diseases of old age account for about 27 percent of first admissions and for 11 percent of all resident patients. Of

those patients who have been in the hospital from 1 to 4 years, 21 percent have been admitted for diseases of old age. New York State estimates that 2 percent of its entire older population (65 years and over) is resident in mental hospitals.

The data I have presented do not reveal the true magnitude of disabling illness among older people. When we consider the available figures, however, we cannot avoid consideration of the social and economic implications of the problem.

The cost of prolonged hospitalization of patients in general hospitals is likely to be prohibitive—not only for the vast majority of elderly persons, but also for their families and for the community in its provisions for the dependent aged and disabled. Chronic disease hospitals, constructed as units of general hospitals, offer many economic advantages in providing hospital care for the aged. In 1952, such hospitals were operated at $6.63 per patient-day, in contrast with a cost of $18.35 per patient-day in general hospitals. At the present time, the Nation has a total of about 55,000 beds in chronic disease hospitals. State hospital agencies report that one-fifth of these are nonacceptable beds because they are in structures that are not fire resistant or that lack essential facilities, or are otherwise defective.

We have no precise estimates of the total amount spent annually for medical and hospital care of the aged from private and public funds. Expenditures by the older people and their families from private income for that purpose, however, must account for a substantial share of the total annual $9 billion expenditure by consumers for medical care. In addition to the costs of maintaining older people in public mental institutions and tuberculosis hospitals, public assistance funds in the amount of nearly $200 million are spent annually for medical and hospital care of the aged alone.

Old age, ill health, and financial difficulties go hand in hand for the great majority of our older people. Ill health is a major cause of retirement when the beneficiary of old-age and survivors insurance reaches age 65, and his reduced income is seldom equal to the strain of heavy medical expenses in a critical or prolonged illness. His savings and other assets may be sharply depleted, even wiped out, in a single year. Financial disaster and dependency are too often the end result of illness in old age.

Better Health—Better Care

Under these conditions, many of our older people watch their long-cherished hopes for self-financed "gracious living in the later years" vanish. And with their hopes, their will to regain health vanishes. Can we at this conference and our counterparts in other parts of the country do anything to revive those hopes and make "gracious living" a reality for more older people? I think we can—if we begin to think and act now as though better health and better care were but two sides of one coin—inseparable.

Homes for the aged, nursing homes, and similar facilities are providing care for a small but significant proportion of our total population in the old-age group. These institutions are destined to play an increasingly important role in the Nation's overall programs for the aging. The waiting lists of individual institutions and the difficulties that referring agencies have in finding a place for clients are only one indication of the increasing consumer demand.

Many older people now hospitalized for long-term illness could be cared for more satisfactorily and at less cost through home care programs or in nursing homes. Many other sick old people, who are now being cared for under unsatisfactory conditions outside of institutions, could be better cared for in nursing homes or chronic disease hospitals. Many others who have no recognized illness or handicap could undoubtedly benefit from some type of sheltered care.

The health status of such an important segment of the population is of serious concern to public health agencies. Likewise, the environmental conditions under which older people live and the health services provided them are of public health concern.

Our State and local health and welfare agencies have a background of experience in this field. Their technical staffs can help tremendously in the development of satisfactory facilities and programs for the care of older people. These official agencies realize, however,

that practical advances in this field depend upon the maintenance of standards which have been jointly developed and agreed to by all of the official and voluntary organizations directly concerned.

In our country, we have relied upon self-discipline and cooperation with State and local governments to give us standards of medical, dental, nursing, educational, legal, and many other professional services. The high quality of professional services in the United States shows that our confidence in this process of partnership has not been misplaced.

The initiative and current activity of the National Social Welfare Assembly and its Committee on the Aging in the field of institutional care for older people, therefore, are in the best traditions of our country. The report on standards of care which you are considering at this conference will be a landmark for all future advances in this field.

Much additional factfinding remains to be done. I am happy to report that the health and welfare departments of 11 States are now cooperating with another voluntary agency—the Commission on Chronic Illness—in a study of nursing care patients in institutions in their jurisdictions. The Public Health Service is cooperating with the commission in this study.

Five of the States engaged in this survey are represented at this conference: Connecticut, Maryland, New York, Rhode Island, and Vermont. The remaining six are California, Colorado, Georgia, Indiana, Minnesota, and New Mexico.

The pilot study has been conducted by the Maryland State Department of Health to obtain data on the numbers, characteristics, and conditions of the people receiving care in nursing homes and similar establishments, and on the types of care they receive. When the commission completes its task of projecting the results from the State surveys on a national scale, we will have a more objective understanding of the situation and a better basis for the measurement of needs.

The survey reveals that in Maryland the proprietary nursing homes are the largest group of establishments providing long-term nursing care for adults. They provide 40 percent of the beds, as contrasted with 20 percent provided by homes for the aged licensed for nursing care, 17 percent provided by chronic disease hospitals, 16 percent by almshouses, and 7 percent by nonprofit nursing homes.

Information about the patients in the proprietary nursing homes thus gives us a significant picture of the older people needing such care in one State. Two in every three are 75 years old or over. Nearly three-fourths of them are women. Two-thirds of the group are widowed and one-fifth were never married. Many of them have outlived all members of their immediate family.

They have been in the home a long time—half of them for more than 1 year; one-fourth, more than 2 years.

The health picture is not encouraging. Two in every five are in the home primarily for heart disease, stroke, or other circulatory disease. Senility is reported as the primary problem in another 20 percent. Fractures, arthritis, mental disorders other than senility, paralysis, and cancer account for the remaining major reasons for being in the home.

They are helpless old people: More than one-third are completely bedfast or are able only to be taken up and put in a chair. One-fourth need an attendant or a wheel chair or "walker" to get about at all. One-third are incontinent. And 60 percent are mentally confused all or part of the time.

Although there is a general similarity in the personal, physical, and medical characteristics of the patients in different types of institutions included in the Maryland study, the available data reveal some significant differences among the institutional types. As Dr. Dean Roberts, director of the Commission on Chronic Illness, has pointed out in a recent paper (*1*), "the general tenor of severity of the patient's condition seems to follow a gradient from those receiving care in chronic disease hospitals through the proprietary nursing homes, the nonprofit nursing homes, homes for the aged, and finally the almshouses where the residents evidence the least extent of disability." Undoubtedly, the complete findings and report of the pilot study will reveal many factors to account for these variations, and these will require careful study in the evaluation of needs.

Against the reported health status of the pa-

tients in Maryland's proprietary nursing homes, the arrangements for medical care by the patients, their families, or the responsible agencies seem to leave much to be desired. Only 3 percent of the patients were reported as having no specific illness as a cause of their invalidism. Yet, at the time of the study, one-fifth of them had not been seen by a physician for 6 months or more. About 8 percent had not been seen by a physician since they entered the home, and nearly one-half of this group had been in the home for periods ranging from 6 months to 10 years or more.

Generally speaking, old people with a known chronic disease or impairment may go along for many months requiring only routine medical supervision. But without medical supervision, it is unlikely that impending crises will be detected and possibly averted. In many cases, the diseases which make invalids of so many older people have not been brought to the attention of a physician early enough to avert prolonged disability. They are difficult to detect; and especially among the elderly, premonitory signs—which in younger people would flag attention—are too often regarded as "normal" signs of the aging process.

Moreover, the occurrence of multiple causes of ill health must be anticipated in caring for older people. A chronic disease may supervene in a patient who on admission is suffering the effects of a fractured hip. In reverse, an acute infection may supervene in a cardiac or diabetic patient. A disease which produces only a minor illness in a healthy person may be very serious in a patient already enfeebled by a chronic disease or extreme age.

For these reasons and others involved in the health and welfare of the aged, arrangements for the care of older people should include specific provisions for medical supervision, as well as for affiliation with appropriate hospitals so that when the need arises, services beyond the reach of a nursing home will be provided promptly. Provisions for assuring a safe and healthful environment, adapted to the special needs of aged and infirm people, are equally important.

Institutions located in our cities are usually within convenient reach of the facilities, professional personnel, and health agencies necessary for assuring their patients medical, hospital, and public health services. Often, however, even these favorably located homes have difficulties in making satisfactory arrangements. Institutions located in rural or semirural areas are more likely to have such problems, especially when many of the patients have been admitted from distant communities and thus have lost contact with their personal physicians.

Joint planning is the first step toward overcoming these difficulties. The health and welfare agencies, both official and voluntary, as well as private and public institutions providing nursing care, could obtain much valuable advice and practical assistance—if they would more frequently bring their State and local medical societies in on the ground floor of such planning. The active participation of the local medical profession is indispensable in the development and operation of any constructive health program for the aging—be it on a statewide basis, in a community, or in an individual institution.

Time for Prevention

The central position of modern medical and public health services in better care for older people is stated explicitly and frequently in the report of the National Committee on the Aging. In this connection, I was particularly impressed by the last section of the report—Developing Alternatives to Institutional Care. Pointing first to the rapidly increasing values of apartment projects, group homes, residence clubs, foster home care plans, home medical care programs, and other arrangements for older people outside institutions, the report continues:

"As alternatives . . . are developed, institutional care itself assumes a specialized function, that of providing a therapeutic, rehabilitative, and consistently supervised environment for older people with special needs" (*2*).

As a sum in public health arithmetic, these challenging new arrangements outside institutions plus the emphasis on the therapeutic, rehabilitative function of institutional care add up to the right answer—prevention.

The time is ripe to extend the concept of prevention to our aging population. In many instances, prevention of chronic diseases and disabling accidents is possible. In almost all

cases, prevention of prolonged and total disability is possible. Never before has medical science had such a wealth of pertinent knowledge and effective techniques ready for application to the health problems of older people. A few years ago, we could only report that medicine was at a stage in its care of the aged comparable with that which saw the birth of modern pediatrics. Today, we can say that geriatrics has attained considerable growth and development and is now able to assert itself with increasing independence. Parallel with that development, we have seen many remarkable advances in the diagnosis and treatment of a wide variety of chronic diseases and serious impairments.

If we are to apply these advances effectively to the health problems of our aging population, however, we must begin to build for better health far in advance of that 65th year which supposedly signifies the onset of old age. The aim in our personal health practices, as well as in our professional relationships and in our community programs, should be to prevent the serious, disabling conditions associated with old age.

There are several ways of looking at the possibilities of this emphasis on prevention. It would give the older people a larger measure of health and happiness and would free them and their families of a considerable economic burden. It would give the community a deeper satisfaction in its efforts to meet one of its most urgent problems, as well as substantial reductions in the costs of long-term care of the sick. And it would mean that a large proportion of old people requiring sheltered care would enter the institutions in better health than many of those now receiving institutional care.

To achieve these results, we will have to emphasize prevention all along the line: chronologically, in the lives of individuals; and organizationally, in our education of professional personnel, in all our hospitals and related facilities, and in our community programs and services.

Better health for the aged may often begin before birth. Dr. Joseph P. Hoët of Louvain University recently reported that by discovering a prediabetic condition among mothers during pregnancy and by treating those with an abnormal blood sugar and their offspring, there is an excellent chance of preventing a high proportion of cases of diabetes in adults. The disease may be present in a latent stage from birth.

I am sure that I do not have to spell out for those of you who have aged diabetics on your public assistance rolls or in your nursing homes, the advantages of such a preventive program in lightening the burden of care for older people.

Recent findings in a number of American research centers—including the Clinical Center of the Public Health Service—point not only to the possible but also to the probable development of new, simple, and relatively inexpensive methods for communitywide attacks on other serious diseases.

If, for example, medical scientists can find some chemical means of detecting and blocking the specific changes in metabolism that lead to certain common forms of arteriosclerosis, we will have a preventive technique as important to medical and public health practice as was the discovery of vitamin C in the prevention of scurvy and vitamin D in the prevention of rickets. It is easy to visualize the changes for the better that such a discovery would make possible in our care of older people in institutions.

Moreover, there are already available a wide variety of new drugs and surgical techniques, advances in physical therapy, and restorative medicine which would greatly improve the health status of our older people. Unfortunately, the older people in institutions are too often the forgotten men and women to whom these effective techniques are not applied.

I do not wish to suggest that medical science has discovered—or is about to discover—elixirs of eternal youth and vigor. I do want to emphasize the medical means now available to make our later years healthier and happier, and to make our aging easier. More such advances are on the way.

We need not have high proportions of the older people in institutions bedfast, dependent, mentally confused—and leading a worse than vegetable existence. Their care need not be such a heavy task, physically; and such a discouraging task, spiritually. The place to begin better care for better health is here—at confer-

ences like this—and in our States and communities, in their health and welfare programs, and in the work of public and private institutions.

The time to begin is now—for the sands of time are running fast for many patients now in institutions. They are running fast for you and me, and for every other adult in our aging population. Will better health and better care await us when it is our turn? In large measure, the answer depends upon what you and your counterparts in the remaining 35 States do. If the spirit of this conference be a guide, I am sure that the answer will be "Yes."

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Building Positive Approaches To the Chronically Ill

UNDER THE TITLE, "Building Positive Approaches to the Chronically Ill," a symposium on the problems of the persons, both professional and nonprofessional, concerned with helping the patient with chronic illness was sponsored by the American Cancer Society at the National Conference of Social Work in June 1953.

Opening the discussions, the chairman, Caroline H. Elledge, M.A., associate professor of social work, University of Denver School of Social Work, quoted this statement from the advance notice describing the symposium: "Constructive adjustment by the patient to permanent physical handicaps and disabilities, as well as to the conditions of degenerative disease, depends to a large extent on the attitudes of those who are close to him and to whom he looks for help." She pointed out that the very use of certain words and phrases, such as "victim of," "devastated by," and "dread disease," have emotional implications which play into the negative rather than the positive feelings persons may have about patients with permanent physical handicaps and chronic illnesses, and she considered this a matter for grave contemplation.

To set the stage for general discussion, a panel of five outlined the problems of the medical team—the medical social worker, the nurse, and the physician—the public assistance worker, and the volunteer in their attempts to meet the needs of chronically ill persons. Presented here, in brief, are the remarks of four members of the panel. The paper by the fifth member, John L. Caughey, Jr., M.D., associate dean of the Western Reserve University School of Medicine, Cleveland, Ohio, was available only in abstract form.

In discussing the physician's obligations, Dr. Caughey emphasized the fact that the very human tendency on the part of the physician to feel frustrated in the chronic disease situation is accentuated by his training in medical school. "The relationships the students have with individual sick persons usually occur during some relatively dramatic acute illness or during the exciting diagnostic phase," he stated. "In neither of these situations is the student helped to learn the true nature of the patient-physician relationship or the role of the physician with the chronically ill patient where the diagnosis is obvious, the therapeutic possibilities limited, and the course prolonged."

The Social Worker

PHR brief

Within the definition for chronic illness, "a prolonged disease process which usually has a gradual beginning and leaves traces of permanent injury to the body even when treatment has been effective," there are many variations which must be considered when talking about positive

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approaches to the chronically ill. The "prolonged process" may be a matter of weeks or of years. The "gradual beginning" may also involve more or less time and have varying degrees of symptom manifestation. The "permanent injury" may be slight, or it may constitute complete or partial loss or impairment of body parts, essential functions, or capacities.

In my remarks, I shall be referring exclusively to chronic disease situations in which severe physical or mental disablement still cannot be prevented or avoided even with a combination of the medical, psychiatric, and social knowledge of today. At Memorial Center for Cancer and Allied Diseases in New York City, I worked with the parents of children who had leukemia, an invariably fatal chronic illness, the duration of which averaged between 1 and 2 years. This is an atypical chronic disease situation; yet, frequently, it is from the extremes of experience that generally applicable principles can most easily be found.

In this work at Memorial Center, we discovered that goals of case service could be plotted only on a negative scale. It was possible to help mothers accept and live with the constantly present shadow of death. It was important to participate in the effort to make the experience no more crippling emotionally for parents than it was by definition. But the caseworker could do nothing to change the essentially irreversible nature of the illness.

In such a situation, casework supervisors have a large task in helping workers to handle their own human reactions to tragedy and to find the truly professional role they have to play in helping mitigate the effects of the circumstances, even though they cannot change the circumstances themselves. There are two aids to supervision which I think may be needed in many chronic disease hospitals, wards, or services. The first of these I shall call personnel management; the other, compensation for limited case goals by broadening professional goals.

Personnel Management

Personnel management, in its simplest terms, consists of defining a working condition which reduces the productive capacity of a number of workers and doing something about it so that productive capacity of a majority of the workers will be restored. If a certain kind of noise reduces the productive capacity of one worker, it is a matter for supervision. If that kind of noise reduces the productive capacity of a number of workers, it is a problem for personnel management. In social work, we are conscious of the "noise factor" for individual workers, but I wonder if we have effectively interpreted the degree to which one worker's reactions may be representative of many workers' reactions. A worker who becomes frustrated and depressed with a caseload of patients who have had radical head and neck surgery and loss or impairment of speech is not necessarily peculiar. Nor is a worker necessarily neurotic who finds difficult a caseload weighted heavily with terminal illnesses.

We must find and define those areas which involve consistently massive emotional impact for most workers. There may be some services to which no worker should be assigned for more than 6 months. We may believe that continuity of social casework service is best achieved by one worker continuing indefinitely on the same service. But this is an idle dream if the "average" worker is unable to tolerate the stress indefinitely. We had better depend upon the "average" worker and establish definite policies for staff rotation to cover the high-pressure areas. It would be far better to permit a worker to continue beyond the rotation period if she is able to and willing to tolerate the stress longer than the hypothetical average worker than to transfer a worker off the service "because she couldn't make the adjustment." On some traditionally 1-worker services it may be better to use half of 2 workers' time than all of 1 worker's time. In this way, excessive pressures may be diluted and the workers given an opportunity to share their experiences in order to reduce the impact.

Sick leave policies should perhaps also be adapted for workers in some of the high-pressure situations. When professional capacity to help terminally ill patients and their families is occasionally paralyzed by a worker's accumulation of feeling, is the worker ill? Whether this is illness or not, temporary escape may be

essential for this worker in order for her to regain her professional capacity. A worker must be helped, through supervision, to use mechanisms other than escape, but even skillful supervision cannot always meet a worker's occasional need to be a million miles away, to forget and deny that human beings are so severely attacked by disease.

Broadening Professional Goals

As compensation for limited case goals, professional goals of social caseworkers can be broadened in two directions: in the development of total community services, and in research.

The social worker who is concerned with chronic illness has the opportunity to see some of the most glaring community needs—home care programs, more facilities for treatment, work and recreation programs for the aged chronically ill, appropriate noninstitutional housing, resources for handicapped children, psychiatric facilities, and vocational rehabilitation programs, for example. The social worker knows, or can know, from daily experience what is needed and why. She has the heart of interpretive material at her finger tips. The time has come to interpret the role of the worker in a chronic disease situation not only in terms of social casework service, but also in terms of responsibility and opportunity to aid in community planning.

There are several ways in which social caseworkers may contribute to research, but here I am most concerned with the development in social service departments of an accepted, inherent function of aiding in the formulation of researchable theory. The social caseworker in a chronic disease situation has an opportunity to observe the reactions of patients before and after surgery—of patients who live daily with the idea of impending death, of patients whose disease has meant radical alteration in living patterns or in physical and emotional functioning. Few people are as well equipped as social workers to find in their daily practice clues to the possible relationships between given diseases and treatment processes and social and emotional phenomena.

For example, the social caseworker on the gynecology service and the social caseworker on the breast service at Memorial Center for Cancer and Allied Diseases in New York City, in informal comparisons of their work, arrived at the impression that women who had had hysterectomies experienced, or at least demonstrated, less emotional trauma than did women who had had radical mastectomies. This is an interesting impression. So interesting, in fact, that one is tempted not just to formulate theories as to why, but to jump to conclusions. Before social workers can permit themselves the luxury of theorizing, however, they must permit themselves to be subjected to a certain amount of scientific discipline. In this situation, there are at least two questions which must be asked. The first is relatively simple: What are the gross comparisons between the patients on these two services and between the services themselves? Are these comparable groups in terms of age, economic level, cultural background, marital status, and so forth? The second question is more difficult to answer. Are these social caseworkers and their practices comparable so that they are using similar bases for their impressions? If comparability in the area of the workers' competence and function, as well as in the groups of patients, is found, then they may proceed to formulate researchable theory which might well form the basis for profound study.

If a social service department has the philosophy that one of its basic functions is to contribute to the understanding of human behavior, and if it is willing to utilize research consultation in developing methods of recording, comparing, and testing observations, there is, I believe, no end to the potentialities for defining theory that can be tested by professional researchers.

Chronically ill persons will be well and fully served by caseworkers who neither seek nor need evidence of human suffering to justify their practice, but who will tolerate the impact of suffering because they have discovered the full significance of the difference their service makes now and in the future. I believe caseworkers can be helped to do this by sound supervision, thoughtful personnel management, and a broadening concept of their responsibility and opportunity in community planning and research.

The Nurse

PHR brief

The nurse contributes to the prevention of chronic illness through the care of patients during sickness. She also has a place in the prevention and control of communicable diseases which may of themselves be chronic or may lead to chronic conditions. It is often the nurse who carries out or assists others to carry out those techniques, in the hospital, the home, or the community, which limit or prevent the transmission of disease. She participates in case-finding programs and in the supervision of patients and contacts, helping to arrange for care as necessary.

The public health nurse is in a strategic position to observe family members, since she is a frequent visitor into many homes. She also often has health problems brought to her attention from many other sources. She may recognize the warning signals of such diseases as cancer, tuberculosis, or mental illness and encourage those in need to seek medical advice. The school nurse, the industrial nurse, the nurse in the physician's office, and the nurse in the outpatient service all have numerous opportunities to participate in accident prevention, health education, and care designed to prevent or minimize handicaps or chronic illnesses.

The effectiveness with which nurses meet their responsibilities to persons with chronic illness, as well as to others, depends largely upon the quality of their preparation and experience. We agree that every nurse should first be an expert practitioner of nursing, but we recognize that nursing now embraces a much broader field of service than it once did. Nurses must be prepared to care for the sick, but they must also be prepared to instruct and supervise patients and their families in various aspects of prevention and health care. They are expected to contribute to the nursing services of many types of agencies. They are called upon to plan for the nursing care of patients, to give some or all of that care, and to instruct and supervise others in giving nursing care.

By Edna L. Fritz, R.N., M.A., director of a demonstration project in curriculum study, National League for Nursing, New York City.

Major Problems

The major concerns in nursing are the augmentation of nursing services and the improved preparation of nurses. In many respects these are interdependent. It is difficult to prepare nurses better in situations where nursing is narrowly conceived or of limited quality, and the betterment of such situations depends largely upon the availability of better prepared nursing personnel. Difficulties in obtaining the services of graduate nurses for chronically ill patients are due in part to the fact that there are not enough nurses to fill every need. However, they are due also to the fact that given a choice of opportunities for service, nurses will usually choose to work in situations that provide both security and satisfaction. These are sometimes lacking in the care of chronically ill patients. Reasons for this can be sought both in the preparation of nurses and in the situations providing care for patients with chronic illness.

When students are prepared in situations where nursing functions are almost exclusively viewed as providing physical care for sick patients in bed and where much of this care is provided by the students themselves, it is understandable that only limited background may be procured in psychology, sociology, psychiatry, and the other disciplines that contribute to effective relationships with people in a diversity of circumstances. The interrelation of emotional and social problems to health may receive little emphasis. The broad range of nursing functions may not be examined, and the students therefore may find it difficult to identify their role in analyzing patients' nursing needs or to plan with others to see that the total needs are met. Patient assignments are often so large that the students cannot get to know their patients well enough to identify their needs. In this situation, there can be little opportunity for patient or family teaching, or little chance to plan and work cooperatively with members of other health disciplines in providing comprehensive care for patients.

Thus, satisfactions are often obtained from the volume of the work done rather than from the quality of care and of the relationships that are established with patients and co-workers.

If a graduate nurse is not skillful in interpersonal relationships and is caring for a long-term patient, the frictions that may exist between them in January can be much accentuated by May. This usually troubles the nurse profoundly, since she may have been made to feel that in any and all circumstances a nurse should be able to adjust to any patient and to any situation. She does not look around her to see what factors have conspired to perpetuate the problem, nor does she have help available in studying the difficulty and planning for its improvement. In a word, her preparation for this kind of nursing has not been adequate, and she therefore rejects the experience, often seeking someone to blame rather than seeking solutions.

Psychiatric Experience

The field of psychiatry provides a striking example of the cyclic nature of the difficulties. Over 50 percent of the hospitalized patients in the country have mental illness, yet only between 3 percent and 5 percent of the graduate nurses working in hospitals are now employed in psychiatric facilities, whereas 48.7 percent of the country's 334,733 active nurses work in hospitals or other institutions. As recently as 1943, only 54 percent of the basic schools of nursing offered experience in psychiatric nursing to their students. However, since that date efforts have been made to have this experience included in the preparation of all nurses, and today over 90 percent of the 1,148 basic schools provide this experience. The number of nurses practicing in psychiatry has increased dramatically percentagewise, but it is still far from adequate. There are approximately 10,000 nurses and 80,000 attendants for some 700,000 hospitalized mental patients.

If students receive their basic preparation in a psychiatric facility where the patients number in the thousands but the total number of graduate nurses can be remembered by name, is it likely that they will be attracted into the field of psychiatric nursing? What is being done about this situation? First, efforts are being made to have psychiatric nursing experience in basic schools looked upon as preparation for beginning positions in the specialty rather than as experience which will improve understanding in any nursing position, a viewpoint which was publicized earlier to make the experience more palatable in the eyes of the students and their families. Second, mental health principles are being integrated throughout nursing curriculums, and work is going forward in many schools to strengthen and broaden the psychiatric nursing experience per se. The division of nursing education of the National League for Nursing is working with nursing schools throughout the country in self-evaluation and improvement in psychiatric education, as well as in other aspects of their educational programs, and organized nursing is beginning to coordinate its efforts with such groups as the American Psychiatric Association for improving nursing services in psychiatric hospitals.

Membership and participation in the National League for Nursing and affiliated State and local leagues provide opportunities for consumers of nursing service, members of allied professional groups, and nurses from many fields of nursing to plan and work together to improve nursing services wherever necessary.

The Welfare Worker

PHR brief

Positive approaches to persons with chronic illness are of inestimable importance in public assistance programs if their basic purpose—the conservation of human resources and providing the opportunity for a useful life—is to be

By Mary S. Weaver, medical assistance standards specialist, Bureau of Public Assistance, Social Security Administration, Department of Health, Education, and Welfare.

achieved. The groups served under Federal-State assistance legislation—the aged, the blind, the permanently and totally disabled, and the families in which children are deprived of parental support or care by reason of the physical or mental incapacity of a parent—are the groups in which the incidence of chronic illness is high.

In public assistance agencies, more than 80 percent of staff has no training in social work. In this 80 percent are workers, supervisors, and administrative personnel. They bring to the job all the attitudes toward illness encountered among the public.

I shall limit my discussion to the problems of public assistance workers in their relationships with the medical profession and the effect of agency structure, policy, and procedures on the workers' relationships with chronically ill persons. Experience with incapacitated parents and the permanently and totally disabled is especially pertinent. Many of the persons involved are still in their productive years; therefore, the possibility of social usefulness or the return to economic independence is present. Most recipients in these two categories live in a family group. Relieving, to the extent possible, the ill effects of long-term illness on wholesome family life is another important end toward which public assistance workers must strive. Consideration must be given to the role, responsibilities, feelings, goals, and potentialities of all of the members of the patient-recipient group.

Physician-Worker Relationship

The proper approach to establishing eligibility when illness is a factor is not only establishing that the individual is ill, but also determining what can be done to enable him to mobilize himself and what resources are available to him so that his capacities are released for the solution of his own problems. In general, public assistance workers have received their equivalent of "medical information for social workers" through experience. This is to say, it has been gathered from many and devious sources in varying degrees of reliability: personal experience, friends, spasmodic or continuing contacts with physicians and health facilities and agencies. These condition the physician-worker relationship.

A basic major problem in this relationship is the failure of public assistance workers to see the commonness of interest they have with physicians in the recipient-patient. Too many still think of the physician as an unapproachable person, preoccupied with epilepsy, arthritis and cortisone, cancer and surgery or radium, and do not realize that his focus is on people who have disease. They expect him to be all-knowing and infallible. Consequently, they believe that what they know about the recipient is either already known to the physician or will contribute nothing to the treatment plan. Although they must depend on the physician to interpret illness to them, they do not assume responsibility for interpreting assistance to the physician.

With the establishment of the category of aid for the permanently and totally disabled, despite the negative connotations, public assistance agencies have made some strides toward improving physician-worker relationships. A major contribution was made by having at least one medical consultant on the State agency's staff. This consultant, who is part of the physician-social-worker team, is oriented to the agency, its needs, and its purposes. He is expected not only to review cases, but also to help the agency devise policies and procedures which serve the agency's purposes and are acceptable and understandable to the medical profession. Although the public assistance worker may not have direct access to the medical consultant, he is at least aware that it is possible for a social worker and a physician to communicate, and that each can contribute to the helpfulness of the other.

Agency Policy and Procedure

In administration, there is much recognition of the worker as the one who carries out the purpose of the agency. There is less expressed cognizance of the influence agency policy and procedure have on the way a worker can carry out that purpose. Public assistance agencies have a serious responsibility for reviewing policies and procedures as a whole, not just those related to health care, for the effects they have

on workers' attitudes toward chronically ill persons. All agency policies should encourage the sick to seek and respond to treatment, maintain health which is restored, and use their own resources with the supportive help of the agency in managing their own affairs to the maximum extent possible.

Policies and procedures completely divorced from health care can create extremely negative results for persons with chronic illness. To illustrate, I am reminded of a family of three in which the father—Mr. Allen, I shall call him—was under care for a chronic cardiac condition. He had managed and supported his family long after his physician had advised him against working in the steel mill. When he could no longer do the work his job required, he applied for and received assistance. He was described by many public assistance workers over a 2-year period as cantankerous, demanding, and uncooperative, but one finally found a way to work with him. She was very sensitive to his need to provide for his family. She talked with his physician about this need and asked him how his heart condition affected the feasibility of vocational rehabilitation. She was told Mr. Allen's activity limitations and that she might do well to discuss with the recipient how he felt about it. Mr. Allen at first said he didn't want anything but his check, but after about three visits from the worker he went to the rehabilitation office to explore what they had to offer. Eventually, he decided upon a course in barbering. He made excellent progress and was enthusiastically sharing with the worker his high hopes for employment.

About this time, the agency issued a policy that required all able-bodied mothers with only one child of school age to take available work within a given time period or assistance would be withdrawn. Mrs. Allen was a docile person whose dependency on her husband was as important to him as to herself. She had not worked since she married, but she took a job as bus girl in a diner on the highway about a mile from home. Her earnings were inadequate so the family received supplementary assistance. One day Mr. Allen's physician called the office to ask what had gone wrong. For three nights in a row he had had to treat Mr. Allen for serious heart attacks. In addition, Mrs. Allen had a bad chest cold. The worker went to see the family immediately. Mr. Allen propped himself up in bed and summoned all of his energy to give the worker a piece of his mind.

The worker was able to discern that this man's problem was his wife's employment, which he viewed as a threat to the assumption and maintenance of his role as head of the household. Mrs. Allen was reacting to having to assume a leadership role which she did not want. The acute exacerbation of Mr. Allen's chronic illness meant that his wife had to stay at home to care for him. How soon he would go back to his training course was uncertain. Additional money was paid to the family because of increased medical expense. The policy about women with only one child accepting employment sounded so simple!

Summary

Physician-worker relationships and agency policy are two areas which can give rise to positive or negative approaches to the chronically ill. Sufficient trained staff under skilled supervision would be ideal, but the day when this can be achieved in public assistance programs is not within the foreseeable future. For the staff now employed, opportunities for educational programs which have content on concepts of disease and the meaning of illness should be developed or strengthened by public assistance agencies. As workers learn about the dynamics and defenses in illness, they will be better able to collaborate with the physician as a positive influence in the lives of people who, though disabled by illness, still strive toward survival and satisfaction.

No matter how adequately trained the staff is, unless the agency affords a climate in which constructive help can be given, the worker cannot help. Policies are the interpretation of the intent and purpose of legislation. They should be looked at in terms of what they do to people as well as what they do for people. The test of any public welfare program is its advancement of individual human welfare.

The Volunteer

PHR brief

Successful rehabilitation for any individual depends on three things: the attitude of the general public; the attitude of the patient himself toward his chronic illness; and, facilities for care and treatment which the community provides. If the general public, which includes the volunteer, believes that every person, regardless of what has happened to him physically, mentally, or socially, is still an individual member of the community, there will be certain universal convictions. Such convictions will include the belief that a chronically ill person must be given the opportunity to develop to the fullest all his capacities, many of which may be hidden or undeveloped, as well as treatment for whatever the disability may be. This attitude of the public will often be reflected in the attitude of the patient toward his situation. This attitude of people with whom the patient comes in contact, whether it be the neighbor who brings in the bowl of soup, the relatives who sacrifice personal desires to be of service, or the professional visiting nurse or social worker, helps the patient retain pride in himself even though he faces tremendous obstacles and even when he recognizes that there is no hope for physical recovery.

Two Groups

I should like to discuss volunteers in two groups. The first includes those who do things on their own and as they see them. These volunteers have innumerable contacts with patients who are chronically ill, and their own attitudes help to influence the patient's attitude toward his disability, his family, and his community. One patient with chronic illness told me once, "I do like Mrs. —— from our church, but honestly, she practically buries me every time she comes." Or, another, "I do like Mrs. ——, but really I cannot stand to hear her problems, and she talks so much." Reaching these volunteers is difficult, but usually they can be reached indirectly through groups of which they are members. Some, of course, are never reached, and go on in their own way.

The second group of volunteers are those who are recruited and trained for specific work and who serve a specific organization. Volunteers in this group either wish to give direct service to a patient—occupational therapy aides, home visitors, and ward aides in hospitals, for example—or to work for a cause which will benefit a patient without coming in contact with him—attendants in waiting rooms, bandage makers, and solicitors for funds. Both of these groups are dedicated to a purpose and both are responsible for creating public opinion. It is a wise organization or agency which recognizes that the volunteer in each group is deeply concerned about someone. Often, what happens to the individual for whom an agency exists is based on the emotions, the knowledge, and the ability of the volunteer. Thoughtful decisions, wonderful plans, beautiful outlines made in high places, like this meeting today, won't make life more livable for Mary Jones, a 35-year-old cancer patient now in a county home with nothing to do, until volunteers of that community decide what they want for persons with chronic illness.

Knowledge Requirements

All volunteers should be well informed about the causes which they serve. Also, they should be given information, from authoritative sources, on the disease itself, the resulting disability, possibilities for rehabilitation, facilities for care, and what is being done and not being done in research or prevention. If the volunteers are giving direct service to patients, they should be told as much as feasible about the plan for the particular patient. The volunteers should understand that most members of the family are bewildered when a chronic illness

By Bell Greve, LL.B., director, Cleveland (Ohio) Department of Public Health and Welfare, formerly executive secretary, Cleveland Rehabilitation Center.

occurs. They should understand the responsibilities of government agencies as well as the responsibilities of all the various private agencies.

All volunteers giving direct service to a patient should be given not only general information but also specific training for the particular service they are to provide. As a rule, volunteers respect training courses and are eager for continued training after they accept an assignment. The attitude of a volunteer toward his particular assignment is often conditioned by the respect which the professional worker or the agency shows for the volunteer service.

In addition to the specific training for ward duty, occupational therapy, or friendly home visiting, the volunteer must understand the implications of the particular chronic illness. For example, a patient should not be considered "stubborn" or "ornery" when his attitude is just as much a part of the chronic illness as is the paralysis, for example. A volunteer should also have easy access to a professional worker who can help the volunteer understand some of the problems which arise.

The intelligent volunteer appreciates his own services. He knows that more and more volunteers are needed. He lives his philosophy, day in and day out. He participates actively in supporting legislation and in backing adequate finances for both government and private agencies. He is eager for research, and he urges an educational program which has prevention as its aim. He recognizes the need of professional staff and never doubts the teamwork of the volunteer and the professional worker. He will recruit staff. He will fight for adequate facilities. The volunteer is the strength behind the health and welfare programs of our country. The professional workers have a definite responsibility in keeping volunteers in step with all the advances in health and welfare.

Note of Thanks

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Use of a Sound Recorder In Nurses' Home Visits

By Marion Ferguson, R.N., Ph.D., and Jeannette E. Westlake, R.N., M.P.H.

NURSES WORK with people so closely and under such varied conditions that the area of interpersonal relations has a special significance for this group.

Consideration of the circumstances which produce effective patient-nurse relationships has long been of concern to practitioners, administrators, and educators in the field of public health nursing. The most common methods for obtaining information about such contacts have been supervisory observations or stenographic and process recordings. Though these methods have been useful to varying degrees, each has certain drawbacks. Any method based on recall of events suffers from possible lack of accuracy and objectivity. While the stenographic transcript may overcome these objections, it fails to reveal the tone and pace of the patient-nurse relationship.

Reports on the use of sound recording equipment seemed to indicate that this method might overcome some of the objections to the procedures previously employed. For some time recording machines have been used in clinic situations to record interviews, and one investigator is using a sound recording device in the field to gather information for curriculum purposes. Further investigation of the use of sound recording equipment for gathering data on the content and conduct of nursing visits in the home was made during the spring of 1953 by the Public Health Service with the cooperation of the Alexandria (Va.) Health Department.

Participating in the field trial in the use of this equipment were 6 public health nurses of the Alexandria Health Department, with 20 of the families they served. As a preliminary to the activity, the group of nurses met to discuss details of procedure. All of them were agreed that, in this trial, they did not want to be responsible for the operation of the recorder. They were sure that it would be impossible for them to conduct an adequate interview under such circumstances since they would be unable to concentrate on the visit content while, at the same time, they made sure that the recorder was operating satisfactorily. They also felt they would be more comfortable if the third person present during the patient-nurse contact was another nurse since they would then have a greater sense of freedom in talking with the patient. Furthermore, the nurses believed that the patients would find it easier to accept the presence of another public health nurse as, in many instances, it would not be the first time two nurses had been in the home at the same time. For these reasons a second nurse was made responsible for recordings in the field.

Equipment Used

It was realized that the instrument used would have to be easily transportable; uncomplicated in operation; and capable of continuously recording a visit of average length. During the study three different types of magnetic recorders—one wire and two tape—were used.

The smallest instrument available was a

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light-weight, battery-activated wire recorder which was easily and simply operated. However, the wire on the machine used in this investigation had a tendency to uncoil. This caused snarling that the nurses found difficult to untangle and too often resulted in the loss of recorded material.

One of the tape recorders was satisfactory except for its shape and weight which made manipulation in the field rather difficult. Moreover, household electric current was necessary for its operation and restricted its use.

The third could be operated either on a self-contained battery or through hookup to the household electric current. With this machine it was therefore possible to obtain a recording of the conversation and related activity from the time the knock at the door was answered until the door was closed at the termination of the visit. Its size, shape, and weight made field use feasible. The only objection to this recorder was that additional equipment was necessary for amplification of the recording to permit group listening.

Collection of Data

No preparation of the patient or family was made prior to the visit. In the field the nurse introduced her associate as "another public health nurse who is with me today," and requested permission to make the recording.

In setting up the machine certain precautions were found necessary to obtain a "good" recording. When the machine was situated outside the direct line of vision of both the patient and the nurse, awareness of its operation was minimized. The recording of the conversation was more comprehensible when the microphone was placed at approximately an equal distance from the participants in the interview and when extraneous noises, either in the immediate vicinity or in an adjoining room, were controlled. It was found that disturbing sounds were reflected from articles, such as lamps or shelves, which were too near the microphone. Television or radio in operation, a crying baby, or similar types of disturbances also made a clear recording impossible.

While the machine was being set up, the nurse and patient carried on a conversation which the nurse tried to keep irrelevant to the purpose of the visit. As soon as the recorder was functioning, the visit was carried through as usual. At its termination the nurses offered to play back the recording. They found that the patients only wanted to hear how their own voices sounded, so neither this activity nor any other connected with the study added more than a few extra minutes to the visit.

Reaction of Families

Little difficulty was anticipated with the families regarding the recording of the visits since many times they had shown interest in helping the field nurses with a variety of projects. However, the phrasing of the request for permission to record made some difference. When a positive reply was indicated, permission was more readily granted. An explanation of the purpose of the recording followed by the question "It's all right with you if we record this visit, isn't it?" brought a more immediate acquiescence than a request "Would you mind if we recorded this visit?"

There were possibly two additional reasons for the ready acceptance of the procedure by the families. The one was that, in giving a reason for making the recording, all emphasis was nurse-centered. The nurses stated they were attempting to find out what a nurse does in order that she and other nurses could do a better job. They made no direct mention of the family problem or the visit content in connection with the recording. A second reason was that practically all of the individuals were interested in, and had some knowledge of, the mechanics of recording. This was shown in two instances when the parent explained the purpose of the machine to a child before there was an opportunity to request permission to use the equipment. When children were present, they were given an opportunity to speak into the microphone and to listen to their recording before the actual interview started. As a result, while they were interested in the procedure, they did not interfere with the operation of the machine.

The presence of the second nurse did not seem to hinder the interview. The explanation

that she was "a public health nurse who was there to obtain the recording" was well accepted.

Reaction of Nurses

Difficulties encountered were, for the most part, related to the workers and not to the patients. The nurse's ability to convey, through actions, words and tone of voice, the impression that the procedure was quite ordinary, certainly helped make the patients feel comfortable. However, the nurses themselves had some difficulty in accepting the procedure. On the first use of the recorder, each nurse stated that she felt self-conscious—that she "couldn't think of a word to say." Tension was also indicated by the "overlapping" in conversation occasioned by the nurse's inability to wait for the patient to complete a statement before she interrupted with a comment.

As the nurses became more familiar with the equipment and more accustomed to the procedure, a change in behavior was noticed. After their first experience, the nurses made a more comprehensive plan for the visit content before going into the field. As they became comfortable about the procedure they showed less concern over possible protracted periods of silence during conversation with the patients. Also, in listening to the playback of the recording of the visit, they were less concerned with how they sounded and more with what actually happened, how and why it occurred, and how they could use the information gained in planning for future work with the patient.

Uses of Material

While the primary purpose of the project was to develop methodology for the collection of data regarding patient-nurse interaction, as one phase of a study of public health nurse functions, other uses for the recordings were soon discovered. The nurses listened to the playback as soon as possible after completing the visit. Their comments showed the possibilities of using this method in self-evaluation. Some of their observations were: "You can really tell what happened on the visit this way." "I didn't remember that the patient made that remark." "No wonder I got that answer from the patient—from this recording I'd never know what was meant either." They criticized their own use of words and sentence structure and, recognizing the relationship to the patient's understanding, determined to improve their ability to express ideas clearly. They tended to be overcritical of their work, to notice the ineffectual, and to fail to see evidences of good service. This is something which would need to be guarded against if the method were used for self-evaluation.

The nurses requested that their supervisor listen to the recordings of their visits so that she could evaluate their work. The supervisor found the recordings of value as supplements for field observations. The recordings provided data on the strengths and weaknesses of the service given by the individual nurse, on her progress in development, and on areas in which further guidance was needed.

Through use of this method it also would be possible to obtain a collection of recordings of material to show actual practice in the field of patient-nurse interaction. This material, which is otherwise unobtainable, would be useful in formal or inservice education of public health nurses. It might serve to demonstrate the degree of achievement to strive for; to evaluate the effectiveness of teaching techniques; to discover whether or not desired objectives are met; or to identify areas in which better ways or kinds of information are needed to improve the effectiveness of nursing service.

Conclusions

This experience with sound recording seems to indicate that it has advantages over methods previously used to collect data on patient-nurse contacts in the field situation because it provides an accurate, objective, and documented record of the patient-nurse interaction. Since incidental noises and activities, as well as tone of voice and pauses in conversation, tend to recreate the atmosphere under which the interview took place, the recording gives the entire situation greater reality than a written report could possibly give.

The recordings might be used for self-evaluation and supervision in public health nursing. Progress in development of the individual

nurse would be clearly indicated through comparison of recordings of early visits with those of later date. The supervisor would find them adequate as a supplement for time-consuming field observations. The staff nurse might use the recordings both as a means for improving her service to patients and as a means for self-improvement in the area of communication.

Although the use of the recorder in the field situation may be considered relatively expensive in cost of equipment, time, and personnel, it seems to yield results that make it a desirable tool for use in this area of interpersonal relations.

technical publications

Fifty-second Annual Conference, Surgeon General, Public Health Service, Chief, Children's Bureau, with State and Territorial Health Officials.

Public Health Service Publication No. 338. 1954. 45 pages.

The 52d annual conference of the Surgeon General of the Public Health Service and the Chief of the Children's Bureau with the State and Territorial health officials was held November 5–7, 1953, in Washington, D. C.

This publication contains the text of the addresses by Nelson Rockefeller, Under Secretary of the Department of Health, Education, and Welfare, Dr. Martha Eliot, and Dr. Leonard Scheele; and the recommendations of the seven committees of the conference. The three major addresses were published in the January 1954 issue of *Public Health Reports*.

Maternal Mortality Statistics, United States, 1950

Vital Statistics—Special Reports. National Summaries, vol. 37, No. 14, December 3, 1953

In 1950, 2,960 women died in the United States from deliveries and complications of pregnancy, childbirth, and the puerperium. The maternal mortality rate was 8.3 per 10,000 live births, the lowest on record for the United States. The rate was seven times as high 35 years ago.

This report presents maternal mortality rates by specific cause and by race; also for urban and rural areas and metropolitan and nonmetropolitan counties, geographic divisions, and States. Maternal mortality rates by race and age are given for 1950, and by race for the years 1915–1950.

Uniform Definitions of Motor Vehicle Accidents

Public Health Service Publication No. 330. 20 pages. 15 cents.

This is the second revision of the Uniform Definitions of Motor Vehicle Accidents and the first since 1947. Used principally by personnel in vital statistics and motor-vehicle accident records bureaus, the manual was revised in order to make it a more useful guide for such offices as well as traffic agencies, insurance companies, and other groups which compile figures on motor-vehicle accidents. It is an important reference for assuring uniformity and comparability in classifying information on traffic accidents.

One change in the revision is a new definition for injury. An appendix defines characteristics of the location of the accident. Injury was redefined to allow three rough classifications at the scene of the accident: objective signs like a bleeding wound or distorted limb; other visible injuries such as swelling, bruises, abrasions, or limping; or complaint of pain without visible signs of injury. These classifications were developed because the previous criterion, need for medical attention within 6 to 12 months of the accident, had proved impractical.

A paragraph was added to the section on allocation of motor-vehicle accidents according to geographic boundaries. No changes were made at this time in the definition of a motor-vehicle accident fatality, and in other respects the manual closely resembles the previous edition.

The definitions were formulated for the National Conference on Uniform Traffic Accident Statistics by a committee under the chairmanship of Dr. Halbert L. Dunn, chief of the National Office of Vital Statistics.

This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Technical Assistance in Public Health

—*The 6-Year Program in Greece*—

By ROBERT L. CHERRY, M.D., M.P.H., and CLARKE W. MANGUN, Jr., M.D., M.P.H.

A review of the major programs of the Public Health Advisory Group of the Mutual Security Agency Mission to Greece. The programs and experiences in Greece have served as a basis for programs in the Near East, Middle East, and Southeast Asia.

THE AXIS INVASION of Greece during 1940 was at least the fifth major invasion of this country in recorded history. The liberation of Greece by the Allied Forces in 1944 was followed by a highly destructive, foreign-supported civil war which left the people of the country in desperate circumstances. After the liberation and before 1947, the United Nations Relief and Rehabilitation Administration (UNRRA) successfully conducted a large-scale program of direct aid to Greece which included assistance in reestablishing health services. This program was actually lifesaving for many of the Greek people. The Congress on May 27, 1947, passed Public Law 75 (80th Cong., 1st sess.), known as the aid program to Greece and Turkey and commonly called the Truman Doctrine. Under this act, aid was made available by the United States to Greece in her struggle to resist communism and to remain free. The

Dr. Cherry spent 4 years in Greece, first as deputy director, then as director of the Public Health Advisory Group of the American Mission. He is now chief of the public health division of the Foreign Operations Administration Mission to Iran. His career has included private, industrial, and public health practice (chiefly with the State and local health departments in Texas and assignments in Bolivia and Colombia with the Institute of Inter-American Affairs). For his service in Italy with the Allied Control Commission (1943–45), he was awarded the United States Typhus Commission medal for exceptionally meritorious service.

Dr. Mangun, deputy director of the Public Health Advisory Group, is now assistant chief of the Heart Disease Program, Division of Special Health Services of the Bureau of State Services, Public Health Service. Before his assignment to Greece in 1951, he served as tuberculosis control officer in the Florida and Kentucky State Health Departments and in Minneapolis and St. Paul. He was also a liaison officer in the Division of International Health, Public Health Service.

The health program to Greece was established by the late Dr. Oswald Hedley, who was chief of the Public Health Division of the American Mission from July 1947 to August 1950.

Left: A new wing added to the nurses' school of the Greek Red Cross Hospital. This wing replaces a former cafe, in which students were housed. Above: Students leave new wing for supervised training in bedside nursing.

aid program to Greece was continued in 1948 under the Marshall Plan (Public Law 472, 80th Cong., 2d sess.) and administered by the Economic Cooperation Administration (ECA), succeeded in 1951 by the mutual security program administered by the Mutual Security Agency and now by the Foreign Operations Administration.

The American Mission for Aid to Greece (AMAG) in 1947 included a Public Health Division which on July 1, 1952, became the Public Health Advisory Group and operated as such until its termination on June 30, 1953. At the peak of AMAG's activity the personnel of the division included 22 Americans, 15 of whom were Public Health Service commissioned officers.

In the 6-year period of aid to Greece, approximately $22 million was spent on technical assistance in health including consultation, training, fellowships, construction, supplies, and equipment. This amount represents about 2.5 percent of the total nonmilitary aid received by Greece from the United States as of June 30, 1953.

All nonmilitary economic aid given to Greece under the AMAG, Marshall Plan, and mutual security program was an outright grant, but for each granted dollar of aid, the Government of Greece was required to deposit an equivalent amount of Greek currency to be used for the economic development of the country. The use of these funds was jointly administered by the Government of Greece and the American Mission.

Reorganizing Health Services

The health facilities of Greece prior to World War II lacked organized divisions within the Ministry of Hygiene for sanitation, tuberculosis control, venereal disease control, maternal and child health, public health nursing, health education, and vital statistics. During World War II and the subsequent civil war, the existing health services were subject to neglect and deliberate destruction. Death rates from preventable diseases rose sharply. Tuberculosis mortality rates were estimated at 400 deaths annually per 100,000 population in some refugee areas. There were an estimated 2 to 3 million cases of malaria a year (*1*). Low pay and political and social factors led many health workers either to abandon their positions or to work on a part-time basis. Personnel shortages were so severe that many programs had to begin with the training of personnel. The 6,500 physicians in the country were maldistributed. There were only 405 graduate nurses and 4 sanitary engineers.

Above: One of the classes of laboratory technicians organized by the American Mission. Students are being instructed in the use and care of pipettes. Right: Students at the new veterinary college in the University of Thessaloniki.

Because the existing Greek Ministry of Hygiene duplicated many functions of related ministries, the Mission advised that it be combined with the Ministry of Housing and Reconstruction and the Ministry of Welfare as a new Ministry of Social Welfare. This recommendation was adopted in January 1951, and the health responsibilities of the three ministries were combined under a General Directorate of Hygiene within the Ministry of Social Welfare. A division of maternal and child health and a division of vital statistics, however, were not included in the new directorate, and as of June 30, 1953, it was still undetermined whether these divisions would become a part of the General Directorate of Hygiene.

While the Public Health Advisory Group desired to be advisory only, it was temporarily necessary for it to take over the medical supply function of the Ministry of Social Welfare in order to prevent the total collapse of this service. This was done at the request of the Greek Government, and the program was gradually resumed by the Ministry of Social Welfare as its services and facilities improved.

Major Coordinating Agencies

When the Public Health Advisory Group of the American Mission started operations in Greece as the Public Health Division in 1947, there were current and extensive programs in the health field conducted by the United Nations International Children's Emergency Fund (UNICEF)—now permanently established as the United Nations Children's Fund—the Cooperative for American Remittances to Europe (CARE), the World Health Organization (WHO), and the United Nations Relief and Rehabilitation Administration.

Close working relationships were maintained with these and other international agencies concerned with health activities. Later these organizations called upon the experience of the Public Health Advisory Group in continuing their technical assistance programs in health. Duplication was thereby avoided, and joint planning with Greek officials for permanent, locally supported programs was successfully carried on.

In addition, consultation and cooperative programs were carried out with many Greek-American organizations, such as the Greek War Relief Association, the Pan Hellenic Association, the American Hellenic Educational and Progressive Association, the Pan Cretan Federation, the Pan Arcadian Federation, the Near East Foundation, and others.

Because many national and international organizations, both governmental and voluntary,

had activities in the fields of health and welfare in Greece, an unofficial coordination and liaison group, called the Social Agencies Council, was organized in 1952 by the participating agencies for the purpose of considering common problems and to make the maximum effective use of available resources. The council was advised on health matters by the Public Health Advisory Group, an arrangement which was helpful in coordinating the health aspects of the consultation and cooperative programs and in increasing their effectiveness.

Refugee Health Program

Following the end of the first world war, 1,500,000 refuges were returned to Greece in 1922 from their former homes in Asia Minor. At that time, the population of Greece was approximately 4,500,000. The health and social problems created by a sudden 33-percent increase in the population were so great that many of them were still unsolved at the beginning of the second world war when hostilities seriously complicated the problem still more. There were approximately 700,000 refugees in Greece by March 1947 as a result of World War II and the subsequent communist guerilla warfare. Through the cooperative efforts of the American Mission, the Greek Government, and Greek and American voluntary organizations, water supply and sewage systems were improvised in refugee areas. These in combination with mobile clinics were successful in avoiding major epidemics and in alleviating much suffering.

Malaria Control Progress

Malaria control in Greece is one of the outstanding public health successes in modern times. The program was initiated by UNRRA and the World Health Organization and continued with the cooperation and financial aid of AMAG. It consisted principally of DDT spraying and dusting of homes and villages, anopheline larvae control in swamplands and areas used for ricegrowing, and epidemiological followup and treatment of diagnosed cases.

Coordination with the insect control program of the Ministry of Agriculture enabled 4,800 villages to receive residual DDT-spraying during the 1948 malaria control season. The prevalence of malaria dropped from pre-World War II estimates of 2 to 3 million cases a year to an estimated 50,000 in 1949 (*2*). Reports for 1950 show only 15 proved cases of malaria in towns of over 5,000 population throughout Greece. Most of these were near the Albanian border where the military situation restricted antimalarial operations. Anopheline mosquitoes with a significant resistance to DDT have been found in Greece (*3*). The situation is now under further study.

The economic saving of the control program is estimated to be between 30 and 60 million man-days a year, and crop yields were increased an estimated 20 to 30 percent. Before the war, Greece was spending the equivalent of $1.2 million yearly to buy one-fifth of the world's quinine output in an effort to suppress the disease. For the 6-year period from 1946 to 1951, inclusive, the cost of DDT alone approximated $1.5 million. The estimated cost for the entire control program from 1947 through 1952 was $1.02 per capita. As a result of malaria control activities, the Greek Government abolished the quinine monopoly which it had set up in previous years.

In the past 2 years, a new study has been initiated to determine if malaria-free areas can be maintained as such by surveys, epidemiological followup, and the use of DDT in the immediate environment of diagnosed cases. Preliminary observations are optimistic that the economic savings will be large if the program is successful.

Sanitary Engineering Program

Sanitary engineering efforts were devoted mainly to water supply programs. Initially, there were administrative difficulties in getting plans approved and projects under way, but good progress was made following the creation of a central water supply policy committee which worked through local authorities.

Before the war, typhoid rates in Greece were among the highest in Europe. Only 16 percent of the rural population was served by any kind of water supply system (*4*). In 1942, approximately 2 million typhoid cases with 1,836

deaths were reported. In 1951, less than 5,000 cases and 14 deaths were reported. Because of the reduction in the number of typhoid cases, an estimated 50 million man-days of work were saved during 1951 as compared with 1942. Between 1947 and 1951, inclusive, the economic saving from the reduction in prevalence of waterborne diseases has been estimated at $7,755,000.

Some of the water distribution systems of Greek cities had been dynamited, and others were badly in need of repair. There were, in addition, many communities without an adequate and safe water supply. Much of the program, therefore, was concerned with the procurement of materials and supplies for repairing and extending old systems and building new ones.

In almost all instances, contributions of local labor or local finances were used in installing the equipment or in meeting or paying a portion of the purchase cost.

As of July 1952, 750 communities had received needed supplies and equipment, 304 community water supply projects had been completed, and work was in progress on 203 additional projects. Approximately 2 million people, or 28 percent of the population, resided in the areas benefited by this program.

Besides providing consultation on administrative improvements in the division of sanitary engineering of the General Directorate of

Table 1. Completed AMAG health facility construction projects (25), June 30, 1953

Project	Number of beds (new)	Location	Ownership	Description of work done
Nurses' school	100	Thessaloníki	Government	Construction of new building to accommodate the school.
Nurses' home	80	Athens	Greek Red Cross	Construction of new wing.
School of hygiene		do	Government	Construction of window blinds and general repairs of building.
Medical supply warehouse		do	do	Construction of new warehouse at Rouf.
Mental hospital	500	do	do	Major repairs and remodeling.
Tuberculosis sanatorium	120	Sparta	do	Completion of unfinished building.
Hadjikosta hospital	35	Ioánnina	Voluntary	Completion of surgical suite, wing, kitchen, and laundry.
Pan Arcadian hospital [1]	260	Trípolis	Government	Construction of new general hospital and nurses' school.
Evangelismos hospital [1]	450	Athens	Voluntary	Completion of annex wing.
Municipal hospital [1]	83	Pírgos	Municipality	Remodeling of general hospital.
American Hellenic Educational Progressive Association hospital.[1]	100	Thessaloníki	Government	Construction of new general hospital.
Nea Ionia health center		Vólos	Social Insurance Institute.	Construction of new health center for Vólos; later sold to the Social Insurance Institute.
Health center		Áyios Nikólaos	Government	Completion of unfinished building.
Do		Arnaía	do	Do.
Do.[1]		Fársala	do	Construction of new community health center and dispensary.
Do.[1]		Filiatrá	do	Do.
Do.[1]		Ierápetra	do	Do.
Do.[1]		Kastélli	do	Do.
Do.[1]		Meligalá	do	Do.
Do.[1]		Thívai	do	Do.
Do.[1]	14	Selinoús	do	Do.
Do.[1]	14	Amaliás	do	Do.
Do.[1]	14	Khrisoúpolis	do	Do.
Do.[1]	14	Kalávrita	do	Do.
Do.[1]	14	Káristos	do	Do.
Number of beds added	1,798			

[1] Projects sponsored by American Mission for Aid to Greece (Economic Cooperation Administration; Mutual Security Agency), and Greek War Relief Association of the United States. Foreign procurement expenditure provided by the Greek War Relief Association.

Hygiene, eight fellowships for training in sanitary engineering were granted.

Health Facilities Construction

Early in the activities of the Public Health Advisory Group, a survey and evaluation of all existing medical care facilities in Greece were made in cooperation with Greek authorities. On the basis of the information gathered, a hospital and health center construction program was developed.

The stage of completion of the major hospital and health facility construction as of June 30, 1953, is shown in tables 1 (completed projects) and 2 (active projects). Not shown are the 53 early emergency projects for badly needed repairs to existing institutions. These projects were financed by AMAG through an appropriation to the Ministry of Hygiene during the fiscal year 1947–48 (*5*).

An agreement between the Greek Government, the American Mission, and the Greek War

Table 2. Active AMAG health facility construction projects (26), June 30, 1953

Project	Number of beds (to be added)	Location	Work to be done
Rabies station		Athens	Remodeling and repairs.
Car park		do	Construction of garage and service station for the vehicles of the Ministry of Social Welfare.
Maternity hospital	400	do	Completion of maternity hospital and midwifery school.
Communicable diseases hospital		do	Construction of laundry and kitchen building; repairs of existing facilities.
Mental hospital	130	Thessaloníki	Completion of new nursing unit.
Tuberculosis sanatorium	150	Ioánnina	Completion of sanatorium; construction of nurses' home.
Do	250	Lamía	Completion of new sanatorium.
Venezeleion tuberculosis sanatorium.	200	Iráklion	Completion of new sanatorium in cooperation with the Pan Cretan Federation and the town of Iráklion.
Civil servants' tuberculosis sanatorium.	80	Attica	Completion of existing contract, part of new wing.
Asvestochori tuberculosis sanatorium.	400	Thessaloníki	Completion of new bed unit, service building, water supply and sewage disposal system, and of surgical, administration, and laboratory sections.
Laikon hospital	200	Athens	Completion of nurses' home, outpatient section, kitchen and laundry; repairs of nursing units.
Hippokrátion	90	do	Completion of nurses' home and service building (kitchen, laundry, and powerplant).
Réthimnon hospital	50	Crete	Completion of new general hospital in cooperation with the Greek War Relief Association.
Kentrikon hospital		Thessaloníki	Remodeling of hospital for use as teaching center for nurses and medical students.
Ierápetra hospital	20	Ierápetra	Construction of nursing unit in the existing health center.
Nea Ionia hospital		Athens	Construction of outpatient wing and completion of laundry and heating plant.
Kalámai hospital		Kalámai	Construction of health center section of the hospital.
State general hospital	200	Piraiévs	Completion of wing and service facilities and of concrete framework in the rest of the 400-bed hospital.
General hospital		Filiátes	Installation of laundry and heating equipment.
Do	100	Vathí (Sámos)	Completion of new hospital.
Do	150	Lamía	Do.
Children's general hospital		Athens	Installation of kitchen and laundry equipment.
Health center laboratory		Lárisa	Repairs and completion.
Do		Pátrai	Do.
Health center		Komotiní	Completion of new health center.
Do		Vólos	Do.
Number of beds to be added	2, 420		

Relief Association provided for the construction of 11 health centers and 2 hospitals and the completion of 2 additional hospitals as part of the total hospital plan of the country (table 1). The health centers, which are located in areas of particular need, were completed and operating by 1950.

As a result of budget reductions, the construction programs strained the financial resources of the Ministry of Social Welfare. Changes of government and other administrative difficulties have made it extremely difficult for many of the hospitals to be completed and placed in operation even though most of the institutions are more than 90-percent completed. A good solution for completing and operating certain of the institutions is the negotiated agreement between the Government and the Social Insurance Institute, which operates a prepaid medical care service. The plan provides that a loan from the institute be used for completion of the hospitals and that the loan be repaid by the Government in services to beneficiaries of the plan.

Medical Supplies Project

After the withdrawal of UNRRA, the Government's facilities for procurement, storage, allocation, and distribution of medical supplies collapsed. At the request of the Government, the Public Health Advisory Group operated the medical supply program until Greece was able to reestablish its own facilities. By assisting in the reorganization of supply procedures, eliminating duplication and luxury-type items, and using local procurement whenever possible, a $15 million purchase request for medical supplies was reduced to $3 million (*6*).

Another saving was effected by the construction of a central medical warehouse and the liquidation of nine scattered medical and sanitary warehouses which were rented. Storage and handling of medical supply items were improved, and the resultant saving in yearly operating expenses is estimated at $70,000.

"Operation end-use medical supplies" was begun in 1951. Its objective was to obtain the best distribution and use of all available medical supplies. Joint Greek-American medical supply teams with authority to make allocations studied 161 hospitals and more than 350 clinics in all areas of Greece. Improvements were made in the utilization of approximately $5,500,000 worth of needed supplies found in storage or not in effective use. Nearly a million dollars worth of supplies was redistributed for more effective use, and $230,000 worth of supplies was made available for sale as unusable surplus.

Tuberculosis Control

Because of reporting difficulties, tuberculosis mortality rates in Greece cannot be based on complete factual data. Prior to World War II, a rate of 100 annual deaths per 100,000 population was estimated. In 1952, the estimate was 250 per 100,000 population, but mortality information available for towns of over 5,000 population gave a calculated rate of 18.4 deaths per 100,000 for the year, which we feel is too low to be accurate. From our experience and observations, we would estimate the present annual death rate from tuberculosis to be about 80 per 100,000 population.

During World War II, tuberculosis death rates rose sharply because of greatly depressed living conditions. After the liberation, UNICEF, in cooperation with the United Nations Relief and Rehabilitation Administration, initiated a tuberculosis control program. These organizations also cooperated with the Scandinavian Red Cross in undertaking an extensive BCG vaccination program.

At the end of 1948, 11 BCG-vaccination teams had tested 59,977 children and vaccinated 33,023. A compulsory BCG-vaccination law was passed by the Parliament in 1949. During 1949 and 1950 the program was expanded, but after December 1950 it was continued on a reduced scale by the Greek Government alone. Approximately 1,467,000 children had been tested and 1,118,000 had been BCG-vaccinated by August 1951 (*7*).

Mass X-ray work in the Athens-Piraíevs (Piraeus) area was begun in 1946 and was continued intermittently through 1949. Bacteriological followup was severely limited, but highly suggestive shadows on the chest X-rays were used as a basis for estimating a 1-percent prevalence of tuberculosis in the adult popula-

tion (*8*). Since World War II, more than 1 million people have received chest X-rays.

The construction of 750 new sanatorium beds for tuberculosis in 6 locations throughout the country and the supplementing of 400 beds in existing tuberculosis sanatoriums to bring the latter up to minimal standards was planned in 1947. The Pan Cretan Federation later joined in a cooperative program with the Government of Greece and ECA for the construction of a 200-bed hospital on the Island of Crete to bring the total additional new beds for tuberculosis in Greece to 1,350.

Preventoriums for the care of healthy children who come from homes where there is a case of tuberculosis are still in use, although the Public Health Advisory Group continually recommended that these facilities be used for the treatment of active cases only.

An effective technical assistance project in tuberculosis control was the 6-week course for training health department personnel and sanatorium employees in the operation of X-ray equipment. As of June 30, 1953, a total of 68 technicians had been trained and had returned to their local communities to work.

Using the combined experience and opinions of all sections of the Public Health Advisory Group, a plan was developed for redistributing X-ray equipment owned by the Greek Government for maximum effective use in the tuberculosis control program.

Other Communicable Diseases

The incidence, prevalence, and mortality rates of communicable diseases in Greece declined during the period of technical assistance in health. In 1948, 1,272 cases of diphtheria and 55 fatalities were reported. The number of diphtheria cases reported in 1952 is not available, but 39 deaths were reported. The morbidity and mortality rates for scarlet fever and whooping cough have undergone similar reductions. However, death rates from diphtheria, whooping cough, typhoid, tetanus, and other preventable diseases still remain high in Greece. The local health centers could do much more than is now being done in reducing the prevalence of these diseases.

Recommendations were made involving modern concepts of venereal disease control. These included acceptance of penicillin as the treatment of choice for syphilis and the use of serologic tests in the evaluation of treatment. A full-time Greek consultant was hired to travel throughout the country assisting local health centers in their venereal disase control programs. The use of penicillin is increasing, and the prevalence of syphilis, as reported, is thought to be decreasing. The Greek Parliament passed legislation making venereal diseases reportable, but more effective programs and improved reporting will require continued consultation and health education.

The Trachoma Problem

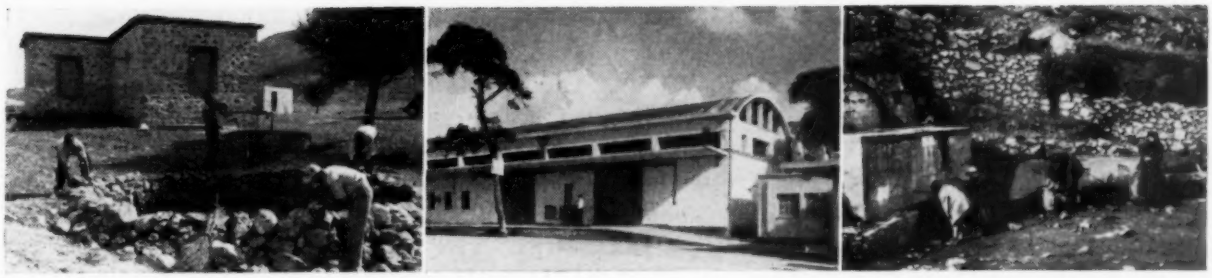
Trachoma continues to be an important health problem in some areas. Rural trachoma clinics adopted the use of newer antibiotics for treatment. A law prohibiting employees from holding more than one government job made necessary the resignation of many part-time clinicians who participated in more than one public health program, and the number of trachoma clinics fell from 51 to 14.

Renewed Interest in Leprosy

In the immediate postwar period, Greek treatment facilities for lepers were very unsatisfactory. Consultation on newer methods of intensive treatment with modern drugs was given, and local health officers were educated in the modern concepts of the social and epidemiological aspects of leprosy. The Ministry of Social Welfare arranged for foreign experts to visit leprosariums and to make recommendations. A bacteriological survey was also made on all leprosy patients, but some who were bacteriologically safe refused to leave the government-supported institutions where they had grown accustomed to a sedentary life. As a result of technical assistance in health, a new interest has developed in the improved treatment of lepers and control of leprosy.

Health Education Service

From its beginning, the Public Health Advisory Group of the American Mission urged



Left: Villagers from Mavrommáti, 60 miles north of Athens, cut down the threat of waterborne diseases by building their own water supply system. Water pumps are housed in the building in the background. Center: Medical supply warehouse near Athens, built as part of the program to improve the acquisition, storage, and distribution of pharmaceuticals and hospital equipment. Right: Townspeople of Alevroú, near ancient Sparta, built this water system with cement and pipe furnished by the American Mission.

the establishment of a division of health education in the Greek health services. Assistance was given in drafting the legislation for creating such a division. A fellowship was granted to a Greek physician for the study of health education in the United States. During 1952, the division of health education was established in the General Directorate of Hygiene with the Greek trainee, who had returned from the United States, as its director. Nine of the eleven positions were filled, and the program began with an inservice training program for personnel of the directorate.

Assistance was given in obtaining equipment for production and duplication of health education materials and in training personnel for the operation of the equipment. During the first 6 months of 1953, the division of health education expanded its program to rural areas by having Greek health officials give talks on health subjects in addition to showing sound motion pictures.

Artificial Limbs Programs

In 1947 there were an estimated 27,000 amputees in Greece. Many of these were women and children wounded by land mines. The existing facilities of the country were inadequate to meet the need for artificial limbs. Jointly administered funds were used to purchase semifinished limbs from Europe and to increase Greek production to approximately 1,000 artificial limbs a month. Greek artificial limb technicians were trained in England through fellowships, and in 1951 Greece produced 2,435 finished artificial limbs.

The services of an orthopedic consultant were made available, and the Near East Foundation made a valuable contribution of hiring 3 physiotherapists to help with the artificial limb program and to assist in developing a school of physiotherapy. A 1-year scholarship in the United States was granted to one physiotherapist. Three others were sent to England for advanced training.

Veterinary Consultation

The Public Health Service veterinary officer assigned to the Public Health Advisory Group worked in the Division of Food and Agriculture of the Mission because his activities were closely related to the agriculture and livestock program. Consultation was given in the control of echinococcosis, anthrax, brucellosis, tuberculosis, and rabies, and assistance was given in opening and equipping eight veterinary clinics throughout Greece. Consultation was also given in developing successful cooperative measures for the joint control of animal diseases in border areas between Greece and Yugoslavia.

From the end of the war through 1953, it is estimated that there has been a 25-percent reduction in the prevalence of infectious and contagious diseases among animals. The resulting increase in the production of meat and milk and the increased work derived from animals have been valued at $20 million for the

period from January 1, 1948, to June 30, 1953.

The rabies control and demonstration carried out on the Island of Zákinthos (Xanthe) resulted in the elimination of the disease from the island and was a successful project. However, more demonstration projects directed to the education of the sheepherders in the country, who own large numbers of sheep dogs, is needed before adequate rabies control legislation can be passed.

The establishment of a veterinary college at the University of Thessaloníki (Salonica) was a significant accomplishment of the veterinary program. Earlier, all veterinary training in Greece had to be obtained abroad. Ninety-eight of the one hundred and ninety-three veterinarians in the country during 1947 were in government employ. WHO expert consultants helped establish the college in 1952, and 30 students started the new 4-year course in veterinary science. The cost of training a veterinarian in Greece is estimated to be about one-fourth that of foreign training.

Equipment was made available through the American Mission to enlarge the Veterinary Microbiological Institute at Athens, and a fellowship was granted for study in Europe. If purchased commercially, the veterinary biologicals produced from 1947 to the end of June 1952 would have cost $1.3 million.

Use of Laboratory Equipment

Extensive laboratory supplies were imported into Greece by UNRRA and later by the American Mission. The laboratory program was concerned with the effective use of this equipment. Two consulting Greek microbiologists were hired to improve the quantity and quality of laboratory work in rural Greece and to survey existing laboratory facilities. These consultants also trained 42 rural health department employees as laboratory technicians in two 9-month courses and then followed the technicians' progress by subsequent field visits. The technicians did excellent work.

Vital Statistics Reporting

During 1948, assistance was given in preparing legislation for vital statistics procedures similar to those used in other European countries and based on the International Statistical Classification of Diseases, Injuries, and Causes of Death. The classification was translated into Greek, and 8,500 copies were distributed. Two physicians and two statistical workers were trained in the application of the classification, and they, in turn, trained 63 Greek officials in its use. A scholarship was also given for 1 year's foreign study in vital statistics methods.

Two United Nations statistical consultants have been giving technical assistance to Greece and have continued this assistance since the withdrawal of the Public Health Advisory Group (the Public Health Division at the time) from this activity in 1950.

As of June 30, 1953, the General Directorate of Hygiene was dependent on the services of the Greek Ministry of Coordination for all vital statistics information. Very little information was available from this source on morbidity and mortality data for towns under 5,000 population. Although progress has been slow, legislation that would provide for a good vital statistics service in the General Directorate of Hygiene is under consideration.

Public Health Nursing

Public health nurses are still a rarity in local health departments. Many rural hospitals have no graduate nurses; it would be unusual to find more than two in any rural hospital. Most of the clinical nursing is still done by practical nurses and nurse assistants. There has been improvement, however, and the next 5 years may see a great increase in the number of nurses and nursing services. Almost all of the 405 registered nurses in 1947 were working in the Athens area. The total enrollment of the 3 existing nursing schools in the country was less than 300.

The State School of Visiting Nurses in Athens was expanded with American aid in 1948 to provide space for 60 additional students. In 1951, a new wing on the Greek Red Cross School of Nursing, also in Athens, provided for a capacity of 50 additional students, and in 1952, a new nursing school with a capacity of 100 students was established in Thessaloníki

(Salonica). These projects brought the total nurse training capacity in Greece to 606 students.

As of June 1952, there were in training approximately 425 nursing students in the 3-year course and 70 students in the 1-year course. The Greek nursing schools were annually graduating approximately 180 3-year students and 40 1-year students. Modern nursing textbooks were translated into Greek, and, with the assistance of the Near East Foundation, visual aids were supplied. A program for training practical nurses was begun during 1948. In 45 Greek institutions, 1,293 practical nurses were trained. In addition, 74 medical corpsmen were trained for service with the Greek Armed Forces. The course lasted 2⅓ years.

The number of graduate nurses known to be employed as of June 1, 1952, was 980. This was more than double the number employed in 1947. There were 1,176 graduate registered nurses who had completed the 3-year nurse-training course. In addition, of the 273 registered nurse assistants who were graduates of the 1-year training course, 140 were working. A third group of volunteer nurses, who had received approximately 6 months' training, were estimated at 5,800. There was also a fourth group of 2,100 untrained practical nurses. Most of the third and fourth groups are working in rural Greece.

A nursing practice act was put into effect in 1950 to regulate the practice and standards of nursing throughout the country. It did much to establish the needed social prestige for the profession, which had been too low to attract young women to a nursing career. The Hellenic Graduate Nurses' Association was successfully reactivated during 1949 as an organization of professional nurses interested in improving nursing in their country.

Professional Training

An early effort was made to improve and expand health training facilities, including the grants of equipment and supplies, and later, foreign fellowships for advanced students and instructors.

A fellowship training program was initiated in 1948 with emphasis placed upon training regular employees of the General Directorate of Hygiene. Fellowship applications were reviewed by the Public Health Advisory Group and then by a fellowship training committee in the Ministry of Coordination. Sixty-five foreign fellowships covering a broad range of needed health activities had been granted as of January 31, 1953. Of these, 42 fellows received training in the United States.

Training standards for the 2 medical schools and the 1 dental school were seriously low. All schools suffered from an excess of students. Large grants of equipment and assistance in expanding the physical capacity of the schools were given. By legislation the dental school was made a separate faculty of the University of Athens on an equal status with other faculties. Previously, it had been partially controlled by the university's medical school. In addition, 30 dental treatment units were procured and installed in the school. These units together with X-ray equipment, which was also provided, helped overcome the inadequacy of the existing equipment.

Athens School of Hygiene

The Athens School of Hygiene, which was under the supervision of the Ministry of Hygiene, underwent severe losses of prestige, staff, and physical facilities after the war. Portions of the school building were taken over by various units of the army, the veterans service, the police, and a midwifery school, so that teaching was not effective.

A project agreement was negotiated in 1950 with the Ministry of Social Welfare for a thorough study of the Athens School of Hygiene to be made by the former dean of the London School of Hygiene and Tropical Medicine. The objective of the study was to develop a proposal for the reorganization and improvement of the school (*9*). Recommendations from a 1929 study by the Rockefeller Foundation formed part of the basis for some of the proposed improvements.

Numerous meetings were held to prepare draft legislation for reorganizing the School of Hygiene, based on the study proposal. Finally, in May 1953, a compromise draft proposal for the reorganization legislation, which was ac-

ceptable to the Ministry of Social Welfare, was started through legislative channels.

Summary

United States assistance to the Greek health program and resulting accomplishments during the 6-year period 1947–53, have been described. In this period, the consultation of United States health technicians, the expenditure of $22 million matched by Greek funds, and the close cooperation with Greek agencies, Greek-American organizations, and international organizations such as UNRRA, UNICEF, WHO, and CARE brought notable improvements in all phases of the health program.

This was the first instance in which United States technical assistance to another country's health program was initiated in an emergency situation and successfully completed. Ill health was a major factor in low living standards and unrest. Constructive United States international cooperation with Greece and with multilateral agencies helped alleviate the emergency and contributed significantly to improved and more stable living conditions for the Greek people, who are an important part of the free world alliance.

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Ideas

The Infectious Baby Sitter

MARICOPA COUNTY, ARIZ. Health cards for baby sitters are being used in Maricopa County, Ariz., which has a population of 265,000.

Dr. Lucy N. Sikorsky, director of the Maricopa County Health Unit, reports that an applicant for a baby sitter's health card is given a free health examination at the health unit. The examination includes chest X-rays and blood tests. The health cards must be renewed each year. Although these cards are not compulsory for baby sitters, they have proved an advantage in getting employment. People prefer the baby sitters who have obtained the cards.

A typical incident which gave impetus to the use of the cards was the discovery recently that 11 children of 2 families, ranging in ages from 3 to 12 years, showed signs of tuberculosis infection. X-rays of the parents showed no evidence of tuberculosis. But these 2 families employed the same baby sitter, and X-rays of this kindly, dependable woman showed positive evidence of pulmonary tuberculosis. The 11 children entrusted to her care had contracted the disease from her.

According to Dr. Sikorsky, discovery of this case halted further spread of the disease to more children by this particular baby sitter, but it also pointed out the vital need for health examinations of persons providing baby-sitting services and domestic help.

Premarital Health Examination Legislation

—History and Analysis—

By J. K. SHAFER, M.D.

UPON ANALYSIS, the principal purpose of the provisions of various statutes requiring premarital physical examinations appears to be the prevention of transmission of syphilis to either party to a marriage and to the prospective progeny of the union. Premarital physical examination is an effective means of discovering whether either party is infected with syphilis and thus protects the innocent partner from acquiring an infection in marriage. Also, as a consequence of discovering an existing venereal infection, other persons may be discovered and treated, persons who otherwise might remain undiscovered.

Premarital laws are meant not to prevent marriages but only to postpone marriages until such time as the infected parties have had adequate treatment or have passed the communicable stage of syphilis.

History

As early as 1913, many States had passed laws regarding premarital physical examination. While these differed from State to State, none of them was particularly effective. A medical certificate of freedom from venereal disease on the part of the male applicant was all that was required to secure a marriage license in Alabama, North Dakota, Oregon, and Wisconsin. In New York and Pennsylvania, both applicants were required to state under oath that they were free from venereal disease and tuberculosis. Indiana, Michigan, New Jersey, Oklahoma, and Vermont had regulations making it a misdemeanor for a person having a venereal disease to marry, but there were no adequate enforcement measures or any penalties for noncompliance. The Utah law provided that a marriage between persons afflicted with a venereal disease was void. The Virginia law provided that if the woman was under 45 years of age, the man must swear that he was free from any contagious venereal disease and he also must make an affidavit that he believed the woman named in the license to marry was free from such disease.

Early in 1918, there was renewed interest in legislation for protection of family life. This interest centered around providing uniform marriage laws and physical examinations for both parties to the marriage. By 1925, a great number of States had adopted general legislation intended to safeguard marriage partners from venereal disease. After 1925, however, the campaign against venereal disease slowed down. There was little enforcement of the

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laws, and practically no new legislation was introduced in the States.

Premarital Examination Law

In 1935, when Connecticut passed what was known as the "premarital examination law," a real pattern was set for this type of legislation in the United States. The early statutes merely had required a personal affidavit of good health from the applicants for a marriage license, but this law required, among other provisions, that a blood test for syphilis and physical examination of both applicants be made. However, it was not until 1936 under the leadership of Surgeon General Thomas Parran of the Public Health Service that a nationwide drive was relaunched. The campaign against venereal disease gained support through State and local measures to combat the disease and through clinics and public health services.

It was this vigorous attack that indirectly influenced the enactment of new premarital health examination laws. There was greater public recognition of the dangers of venereal disease to the public health and to the national welfare. There was recognition of the need to provide health checks at strategic points in life, such as at the time of marriage. Compulsory reporting of venereal disease and provision for treatment of infected persons may have helped change public feeling about concealment of the presence of a venereal infection. Certain principles of eugenics sponsored by the national office of the American Eugenics Society gained wider acceptance. Those principles stressed the importance of health examinations and waiting periods between applications for and issuance of marriage licenses. They advocated restrictions on marriages of the unfit and ways to improve the physical and mental qualities of the population of the United States. In 1937, 5 States passed acceptable legislation, and by 1939, 12 additional States had enacted premarital examination laws.

The proposed and enacted legislation (*1*) which required compulsory health examination to exclude venereal disease in applicants for marriage aroused heated opposition. The physicians themselves were the main opponents. They pointed out that it required too much reliance on blood tests. They challenged the reliability of any particular test or combination of tests and suggested that healthy people might be penalized. There was much talk about the threat to the liberty of the individual and the professional secrecy of the physician from improper legislation. Public health authorities argued that the discovery and treatment of one case of unsuspected syphilis is a gain to society and that theoretical objections concerning the validity of the blood test should be disregarded.

An Informed Citizenry

Problems confronting various States attempting to enlist public support for passage of premarital examination laws were recognized. The fact that the first sound premarital legislation (Connecticut, 1935) was so long in coming suggested that much work in public education was necessary and a program to inform the citizens of the various States would require cooperation on all sides.

In the fall of 1941, a plan was worked out to stimulate public interest. The Division of Venereal Disease of the Public Health Service requested the health officers in 33 States where premarital laws were in effect to describe their methods for organizing public sentiment toward sound premarital legislation.

How were the provisions of the act first publicized? How was the information kept before the public? How were the courts, marriage authorities, and the physicians informed about the proposed act. What educational media were employed? Health officers in various States were asked these specific questions in the hope that the answers to them might serve as a guide to those States in which premarital legislation was being considered. Twenty-eight States responded, sending copies of their premarital examination laws and samples of their education material.

Twenty of the States reported they relied upon newspapers as the major medium for publicizing the provisions of the legislation. Some States faced an indifferent and sometimes critical press, but personal calls upon the editors of the newspapers by sponsoring clubwomen usually brought support for the legislation. Eight States sent letters, pamphlets, and leaflets to all the physicians in the State, and enlisted the cooperation of State or county

medical journals. Civic groups and other nonprofessional organizations cooperated in six States and carried on the educational and informational campaign for the health departments. Five States set up a program of lectures for nonprofessional audiences on the public health value of premarital examination laws. One State organized its publicity through women's clubs; their members throughout the State made personal calls on the officers of the courts, marriage clerks, private physicians, ministers, and school superintendents. These women explained to these groups the provisions of the law and the benefits that arise through such health examinations to the parties being married as well as to society itself. Five States supplied literature to the county health offices and to the clerk of the court's office for distribution to all marriage applicants. All information received by the Division of Venereal Disease of the Public Health Service was then made available through a report to the various States contemplating either premarital legislation or a revision of their old laws.

Once premarital legislation has become law, the continuing effectiveness of the law's operation depends upon an informed citizenry. Newspaper releases, public lectures, motion pictures, and other educational media may be utilized.

Results of Legislation

Of the 631,206 blood tests made from 1936 to 1941 in 13 States (*2*), 8,605 (1.4 percent) were found to be positive for syphilis. Many who had a positive reaction to the blood test were interviewed, and the greater proportion of those interviewed who had syphilis stated that they had been unaware of the infection prior to getting a blood test. In New Jersey (*3*), of 20,202 tests performed in the State health department laboratory during a 9-month period in 1936, 226 persons had positive premarital blood tests. A questionnaire was mailed by the health department to the physicians who had sent in the blood samples of these persons, and replies were returned for 206 of this group. Of these 206 individuals, 93 were granted marriage certificates because, in the examining physicians' opinion, the disease was not in a communicable state; and 113 were refused certificates to marry. The reports also indicated that 113 (55 percent) were still under treatment approximately 3 months after the tests; 34 (16.5 percent) were not under treatment; and 59 (29 percent) had disappeared (so far as the doctor was concerned). Many of the physicians reporting on the last 2 groups suggested that followup machinery be put into motion to get these persons under treatment.

During the first 6 months the legislation requiring a premarital physical examination was in operation in West Virginia, in 1939, positive blood tests were found in 4.2 percent of 1,600 persons examined; in the next 12 months, this percentage dropped to 2.4.

However, as the implications of positive blood tests became known, the rate of positive reactions dropped suddenly, and it was believed that many people suspecting that they might have a positive serologic test for syphilis were avoiding examination and avoiding the statute by various devices.

In Connecticut (*4*), the marriage rates for the 2 years preceding the enactment of the law (1935) were 7.1 per 1,000 population. For the next 3 years, 1935, 1936, and 1937, the rates dropped to 6.8, 5.9, and 6.4, respectively.

Illinois passed a premarital health examination law in June 1937. The number of marriage licenses issued in the State, excluding Cook County, dropped from 54,545 in 1936 to 46,068 in 1939, a decrease of 15.5 percent. In Cook County (*5*), the number issued dropped from 43,775 in 1936 to 35,111 in 1939, a decrease of 19.8 percent.

In upstate New York (New York State exclusive of New York City), marriages of State residents increased in 1939 over 1938, the year the law became effective, but the number of nonresident marriages decreased.

In Rhode Island, there were 6,753 marriages in 1937, 4,916 marriages in 1938, the year the law became effective, and 5,501 in 1939.

Opponents of premarital examination legislation pointed to the ineffectiveness of the statutes. They said that evidence showed that those persons suspecting the presence of syphilis simply avoided the examination; enactment of the law merely had resulted in evasion of its

provisions and also had caused a decline in the number of marriages. Public health authorities agreed that there apparently was some evasion of the law but that the marriage rate had suffered no actual decline attributable primarily to the enactment of premarital health legislation (*3*).

The passage and amendment of premarital laws at different times in various States and originating in separate legislatures resulted in a diversity of legal and administrative detail (*6*). Although these laws were quite simple in operation for residents of the particular State, certain stipulations of some laws caused difficulty for out-of-State residents, for example, the lack of reciprocity in accepting examination certificates signed by out-of-State physicians and in accepting results of laboratory tests performed in other States. These points and others aroused considerable discussion, and remedial action was taken by some public health officials.

On March 23, 1949, the venereal disease control officers of New York and the New England States agreed on the essentials of a premarital examination and on an acceptable medical certificate form for use in intrastate and interstate marriages (*7*). Following this, the Massachusetts law was amended in 1950 so that this State now could accept medical certificates, when properly executed, from 34 States, 2 Territories, and New York City. Today, 27 of the 40 States having premarital examination laws will accept the reports of out-of-State physicians; 37 will accept results of out-of-State laboratories.

Scope of Law

At the present time, 40 States and the Territories of Hawaii and Alaska have premarital health examination laws. The majority of these laws require that both the prospective bride and groom have a physical examination, including a blood test for syphilis, prior to issuance of a marriage license. Louisiana's law requires that only the man have a physical examination; a blood test is given at the discretion of the physician. Arizona, Maryland, Minnesota, Nevada, New Mexico, South Carolina, Washington, the District of Columbia, Puerto Rico, and the Virgin Islands do not have laws which require premarital health examination.

Cost of Medical Examination

The cost of making laboratory tests and conducting physical examinations must be borne either by the individual applicants or by the public health authorities. The examination and taking of blood specimens require skill and training. Many States feel a reasonable charge for such service is fair practice. Medical societies in conjunction with health departments have worked out standard fees to be charged in most county and urban areas. The Oregon law limits the charge to $10 for each couple. This fee covers examinations and the necessary certificate. Illinois makes no charge for blood tests done in the State laboratory and specifically limits the charge of any physician making the physical examination and issuing the necessary certificate to $5 a person. In North Dakota, the fee must not exceed $0.50, and in Wisconsin it is $2.

Persons who cannot afford to consult a private physician usually can have the physical examination performed in a local health department. Most State premarital examination laws provide for free laboratory tests upon request of the examining physician.

Penalties for Falsification

Most of the statutes requiring a premarital physical examination for syphilis for both parties to the marriage provide penalties for a physician or laboratory technician who falsifies a health report. In some States (*4*), the parties of the marriage may be penalized for failure to comply with the law. Rhode Island (*8*) enacted a statute providing that residents who marry outside the State and in a State where no health examination is necessary must undergo a blood test after their return to Rhode Island. North Carolina and Wisconsin have the same provision. Such laws may deter evasion, but the obvious difficulties of enforcement make doubtful its practicability. All States that have enacted a premarital law have provided a measure of flexibility to the imposition of the requirement that a license shall not be

used without a medical certificate. In the interest of legitimization of issue, when a woman is pregnant a license may be issued in such States without medical examination at the discretion of an appropriate court officer or designated authority. In general, penalties vary from State to State, but the penalty usually is a fine not exceeding $1,000.

Problems in Administration

One of the problems in the administration of the law is that of identification of applicants. In some instances, an individual fearing he has syphilis in a communicable state will send a friend to take the premarital examination under the applicant's name. One method of checking this practice is to require the applicants to sign the examination form in the presence of the examining physician. Comparison of these signatures with the signatures on the marriage application should reveal any attempt at fraud.

Formerly, common law marriages constituted a threat to the premarital health examination laws. These marriages offered an easy way of avoiding the law. Now, 30 States have passed legislation declaring that future common law marriages will be invalid. Many States have legislation, however, declaring all common law marriages performed in their jurisdiction, past and future, are invalid. Others recognize common law marriage performed before a specified date or those performed between specified dates. Eighteen States (Alabama, Colorado, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Michigan, Mississippi, Montana, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, and Texas) and the District of Columbia recognize common law marriages as valid. In these States, with the exception of Pennsylvania, neither a license nor a public record for common law marriage is required for such marriages.

Pennsylvania amended its marriage law in 1939 to include a provision affecting common law marriage. This provision requires that any person seeking to be married under common law first must obtain a marriage license and must furnish a certificate showing freedom from syphilis. The law, however, does not require registration of common law marriages and does not make invalid a common law marriage without a license.

All American jurisdictions now have marriage license laws. However, a license is generally not essential to validity of marriage since the great majority of courts construe license statutes as being directory and not mandatory. A few States allow banns to be published as a substitute for a license (*9*).

In addition to providing for the solemnization of marriage in the usual way by a civil or religious officiating officer, a large majority of jurisdictions expressly sanction the celebration of marriage in accordance with customs of particular religious sects or societies. The necessity for special provisions in favor of sects such as the Quakers, for example, arises from the fact that their ceremonies may not call for the intervention of a solemnizing officer; hence, the customary general statute which authorized certain officers to solemnize marriage would not include these ceremonies. Some religious societies are not recognized as "denominations" and, unless by specific statutes they are brought within the scope of the law authorizing the solemnization of marriage either by them or their officers, their legal authority to do so would be dubious, to say the least (*10*). Marriage of tribal Indians in their tribe, valid according to the law of the tribe, will be recognized as valid (*11*). Indiana excepts the Old Amish Mennonite Church, German Baptists, and Friends Church from the law and permits marriage according to the rules of their societies.

In States where there is no specific exception, and a premarital health examination law exists, certain religious sects are married under the common law procedures. So-called common law marriage jurisdiction presents a special situation since marriage with or without a ceremony, license, or a solemnizing official is recognized. Therefore the courts find it "simpler to validate a marriage not complying with statutory formalities, present mutual consent to become man and wife only being necessary" (*12*).

Since neither license to marry nor registration of marriage is required in 17 States under common law provisions, it is difficult to know just how many of these marriages exist in States

permitting this type of marriage and whether the lack of premarital health examination would affect the incidence of congenital syphilis. With the outlawing of common law marriages in most States, evasion through that method now is practically eliminated.

Another method of evasion was a trip by the couple to a State lacking a premarital examination statute. With more and more States passing premarital health examination laws, it now appears that avoidance is becoming more difficult than in the past.

Proposed marriage plans often are upset when applicants wait until too short a time before marriage for the examination, and the blood specimen for either of the parties is positive (*3*). Lack of time to make adjustments creates a distressing problem which may be avoided by having a preliminary test well in advance of the contemplated marriage. A growing custom among young people is that of having blood tests taken weeks in advance of the wedding. If the test report is positive, plans can be postponed. If the tests are negative, new tests are then made within the statutory limit.

Constitutionality of Law

A State is fully sovereign with respect to the control and regulation of marriages for the purpose of promoting public morality and moral and physical development of the individuals, and every State has the power to determine who shall assume or occupy the matrimonial relationship within its border (*13*). The court case of *Peterson* v. *Widule*, in 1913, involved the premarital test for venereal disease. It was alleged that the statute was "arbitrary, unreasonable discriminatory classification, in that it applied to male applicants only." The court held that "it is within the police power to prohibit a marriage until the fact of the absence of venereal disease in the male is ascertained." The court further held that "society has a right to protect itself from extinction and its members from a fate worse than death" (*14*). Marriages violative of public policy usually are held void in the State of domicile. So far, the courts have not seen fit to declare void marriages contracted within a State where compliance with premarital health examination laws has been avoided. The courts hold that avoidance of premarital examination does not invalidate an otherwise valid marriage. In the absence of a stronger declaration of policy, the court will not depart from the established rule that a marriage valid where celebrated is valid everywhere (*15*).

Premarital Counseling

In 1945, the premarital women's clinic in Los Angeles (*16*) decided to add premarital counseling to premarital physical examinations. From 217 patients selected because of youth, anxiety about their forthcoming marriage, or upon personal request, the counseling service tried to determine the type of information desired. Counseling varied according to the type of questions most frequently asked. In the 4 years the study was in operation, the clinic furnished essential information and cleared up many misconceptions concerning health and marriage. It was generally agreed that premarital counseling was an excellent public health adjunct to the premarital physical examination.

The progress made in venereal disease control is one of the important developments of modern times. The venereal disease control program is constructive and remedial and seeks to strengthen and preserve the healthy family as a social unit. In order to control venereal disease, it is essential that people be informed about these diseases. There are three aspects to the premarital health examination law: education, case finding, and an evaluation of a venereal disease control program.

The premarital health examination law augments other legislation pertaining to venereal disease control. Proper legislation and enforcement of laws are necessary to maintain a smoothly functioning control program. Regulatory laws are necessary to insure reporting, adequate treatment, quarantine, and followup of persons with venereal disease.

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From CHILDREN . . . . .

Management of Maternity Care

In the light of the predicted physician shortage and our changing concepts of the kind and quality of maternity care required, Dr. Nicholson J. Eastman, Johns Hopkins University professor of obstetrics, suggests a solution may be found in the training of "obstetric assistants" ("Maternity Care Looks to the Future," Jan.–Feb. 1954). This term is one of several used to designate graduate nurses with advanced clinical training in maternity care who assume responsibility under the direction and control of an obstetrician for a mother throughout pregnancy, labor, and the puerperium.

In all likelihood, the observations made by such highly skilled nurses would be just as reliable as those of an intern, probably more so. As to the workability of such a plan in underdeveloped rural areas, Dr. Eastman cites the Frontier Nursing Service in Kentucky and the successful program on the Eastern Shore of Maryland, where home delivery was the rule except for complicated cases. The idea of maternity nurses delivering babies in the hospital is a new one in the United States, however. But any thought of resurrecting the independently operating midwife is out of the question.

Realizing the problems inherent in training "advanced maternity nurses," Johns Hopkins Hospital in 1953 started a training program to study the feasibility of training "nurse-midwives" in a university obstetric clinic, to evaluate their specific contributions to maternity care, and to ascertain the role which they can play on the obstetric team. Although the program is still an experiment, Dr. Eastman observes that nurses with this type of training have unique and urgently needed contributions to make. Quite apart from the expected physician shortage, mothers everywhere stand to benefit from the meticulous, sympathetic, and highly personalized attention these specialists give. As in other clinical fields, such as psychiatry, the profession of nursing will enhance its position by qualifying its members for increasing responsibilities.

Children—successor to *The Child*—is published bimonthly by the Children's Bureau, U. S. Department of Health, Education, and Welfare. The first issue appeared in January–February 1954. The subscription rate is $1.25 a year ($1.75 for foreign mailing). Single copies are 25 cents each.

Survival of *C. immitis* In Passage Through the Digestive Tract of Mice

By Robert Lubarsky, M.A.,
and Orda A. Plunkett, Ph.D.

COCCIDIOIDOMYCOSIS, or valley fever, is a deep seated mycotic infection caused by the phycomycete *Coccidioides immitis*. Although found in many areas, coccidioidomycosis is endemic to large areas of southwestern United States, especially the San Joaquin Valley of southern California (*1*).

In 1942, Emmons (*2*, *3*) suggested that certain wild rodents, especially pocket mice, may act as reservoirs of the parasites through infection. Since there have been no published reports that *C. immitis* is destroyed, either in the vegetative arthrospore stage or in the parasitic spherule stage, by passage through the digestive tract of animals, the possibility that animals ingesting viable spores may act as disseminators of *C. immitis* by means of fecal droppings has been overlooked.

The experiments reported here show that *C. immitis* arthrospores and spherules survive intestinal passage through rodents.

Mr. Lubarsky is a teaching assistant and Dr. Plunkett is a professor, department of botany (mycology), at the University of California. Dr. Plunkett is also a consultant on fungus diseases at the Los Angeles County General Hospital. *This paper was presented in June 1953 before the Southern California Branch, Society of American Bacteriologists, American Association for the Advancement of Science, at Santa Barbara, Calif.*

First Experiment

It was found that *C. immitis* could be recovered from feces directly from the intestinal tract of mice infected by means of intraperitoneal inoculation. Such fecal infections were found to be due to ulceration of the intestinal wall by needle puncture, with resulting drainage of material containing spherules directly into the intestinal tract. Since these viable spores had not been subjected to the digestive juices of the stomach, it was decided to test their ability to withstand digestion by feeding arthrospores and spherules in drinking water to healthy mice in such a way that external contamination of the fecal matter would not be possible.

A screwcapped 25 x 200 mm. test tube was used to hold the contaminated water. A hole drilled into the top of the cap was large enough for the mice to drink by lapping at the hole, but small enough to prevent any dripping when the tube was inverted. The tube was then clamped to a wooden platform and inserted inside the glass animal cage. The platform protected and prevented the tube from being jarred by any movements of the mice (see illustration).

Two mice in separate cages were fed dry mouse food, but given no water for 24 hours prior to being exposed to contaminated water. The cages were cleaned and sterilized, and fresh sawdust was placed in them just prior to exposure.

A very heavy aqueous suspension of *C. immitis* arthrospores and mycelia was prepared, and each drinking tube was filled with 10 ml. of this suspension. The tubes were inverted over paper towels saturated with formal acetic alcohol to catch any of the contaminated water forced out by the inversion. The tubes were wiped dry and carefully inserted into the animal jars, avoiding any cause for dripping. The mice were allowed access to this water for a period of 3 hours, and then the contaminated water and containers were removed and replaced with uncontaminated water.

Twenty-four hours later a composite sample of feces was taken from each cage. The sample consisted of 10 pieces of feces taken at random from the cages. Each sample was then macerated in 5 ml. of sterile distilled water and a loopful of the mixture was streaked on a plate of the cycloheximide medium developed by Georg, Ajello, and Gordon in 1951 (*4*). Ten plates were made of each fecal sample.

A second group of composite samples was taken 12 hours after the first samples and given the same treatment. This experiment was repeated three times within 1 week using the same animals, allowing a 1-day interval between tests. At the end of 3 weeks the mice were killed and autopsied.

Results

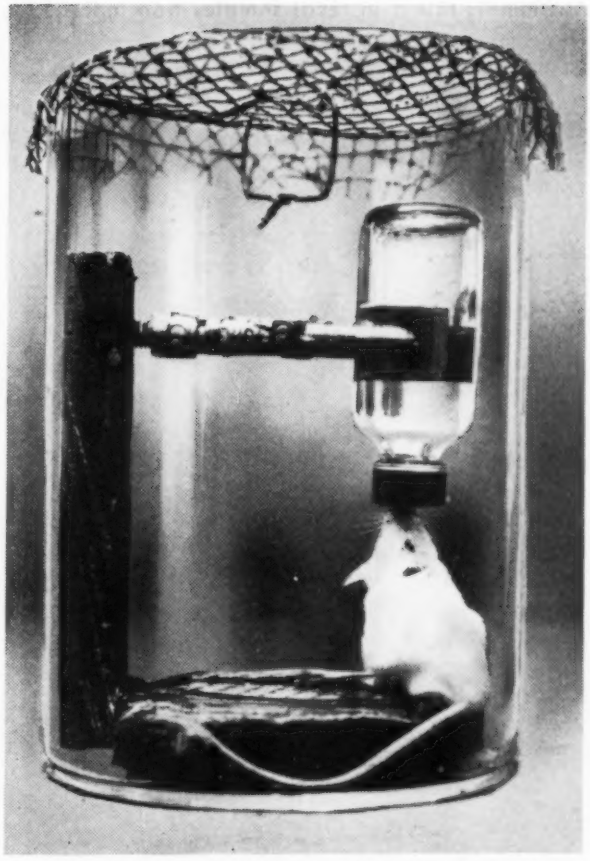
Plating of all the 24-hour samples yielded positive growth of *C. immitis*, confirmed microscopically. Isolation of *C. immitis* was negative on all samples taken after 36 hours. Autopsy of the mice showed no visual signs of infection; smear slides and cultures proved to be negative.

Second Experiment

A similar experiment was conducted using six mice. In the first series the mice were fed suspensions containing spherules obtained from 2 mice that had been inoculated intraperitoneally with 1 ml. of a heavy aqueous suspension of arthrospores and mycelia.

At the end of 6 days, both mice showed signs of intense illness. The first mouse was then killed and autopsy revealed a heavy infection due to *C. immitis*, which was later isolated on cycloheximide medium and also through the germination of spherules on broth culture slides. The liver, diaphragm, lungs, and spleen of this mouse were then macerated in 60 ml. of sterile distilled water, and 10 ml. of this macerated suspension was placed in each drinking tube for each mouse. The feces of each mouse were collected individually for a 24-hour period.

Two days later, the second infected mouse was killed and the experiment was repeated using the same tissues in a macerated suspension. The feces were again collected for a 24-hour period. Two days later, the experiment



Apparatus for delivery of contaminated drinking water

reverted to the use of *C. immitis* arthrospores and mycelia.

The experiment using the arthrospores was repeated every 2 days for 2 weeks, and then halted. Samples of feces were taken from each mouse every 24 hours. Subsamples consisting of 10 pieces of feces were macerated in sterile distilled water and plated on cycloheximide medium. Five plates were made from each subsample, 6 samples from each 24-hour run, or a total of 30 plates for each run.

One week later, one of the mice was killed and examined for evidence of infection with *C. immitis*. Two weeks after this, another of the mice was killed and examined for infection with *C. immitis*. Neither mouse showed any sign of infection with *C. immitis* and isolation of the organism was not possible.

Results

The feeding of *C. immitis* spherules resulted in positive isolation of *C. immitis* from the

C. immitis found in fecal samples from mice 12 and 24 hours after ingesting arthrospores and spherules

Animal No.	Arthrospore exposure [1]									Spherule exposure [1]								
	Sample 1			Sample 2			Sample 3			Sample 4			Sample 5			Sample 6		
	S	S	C	S	S	C	S	S	C	S	S	C	S	S	C	S	S	C
	12	24	24	12	24	24	12	24	24	12	24	24	12	24	24	12	24	24
	Laboratory mice																	
1	+2	+2	+3	+2	+2	+1	+3	+2	+3	+2	+3	+2	+3	+2	+3	+3	+2	+3
	−1	−1	0	−1	−1	−2	0	−1	0	−1	0	−1	0	−1	0	0	−1	0
2	+2	+2	+3	+2	+3	+3	+3	+3	+2	+3	+2	+3	+2	+2	+3	+3	+2	+3
	−1	−1	0	−1	0	0	0	0	−1	0	−1	0	−1	−1	0	0	−1	0
3	+2	+1	+3	+2	+2	+3	+2	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+2
	−1	−2	0	−1	−1	0	−1	0	−1	0	0	0	0	0	0	0	0	−1
4	+2	+1	+3	+2	+3	+2	+2	+2	+3	+2	+1	+3	+3	+3	+3	+2	+2	+3
	−1	−2	0	−1	0	−1	−1	−1	0	−1	−2	0	0	0	0	−1	−1	0
5	+1	+2	+3	+2	+1	+3	+1	+2	+3	+1	+3	+2	+1	+2	+3	+3	+3	+2
	−2	−1	0	−1	−2	0	−2	−1	0	−2	0	−1	−2	−1	0	0	0	−1
6	+1	+1	+3	+2	+3	+2	+3	+2	+1	+2	+3	+2	+3	+2	+3	+2	+2	+3
	−2	−2	0	−1	0	−1	0	−1	−2	−1	0	−1	0	−1	0	−1	−1	0
7	+2	+1	+3	+2	+1	+1	+1	+2	+3	+2	+2	+3	+2	+3	+2	+3	+3	+3
	−1	−2	0	−1	−2	−2	−2	−1	0	−1	−1	0	−1	0	−1	0	0	0
8	+2	+2	+3	+2	+2	+3	+2	+3	+3	+3	+2	+3	+2	+1	+2	+2	+2	+3
	−1	−1	0	−1	−1	0	−1	0	0	0	−1	0	−1	−2	−1	−1	−1	0
9	+1	+1	+3	+2	+3	+3	+2	+1	+3	+3	+1	+2	+3	+1	+3	+3	+3	+3
	−2	−2	0	−1	0	0	−1	−2	0	0	−2	−1	0	−2	0	0	0	0
10	+2	+1	+3	+1	+1	+2	+3	+2	+2	+3	+1	+3	+3	+2	+3	+2	+3	+3
	−1	−2	0	−2	−2	−1	0	−1	−1	0	−2	0	0	−1	0	−1	0	0
11	+1	+2	+3	+2	+3	+3	+1	+2	+3	+2	+3	+3	+2	+3	+3	+3	+2	+2
	−2	−1	0	−1	0	0	−2	−1	0	−1	0	0	−1	0	0	0	−1	−1
12	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+1	+2	+3	+3	+3	+3	+3
	−2	−2	0	−1	−1	0	0	−1	0	0	−1	−2	−1	0	0	0	0	0
	Wild mice																	
1	+3	+2	+3	+3	+2	+2	+3	+1	+3	+2	+1	+3	+3	+2	+2	+3	+1	+3
	0	−1	0	0	−1	−1	0	−2	0	−1	−2	0	0	−1	−1	0	−2	0
2	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+2	+3	+1	+3	+3	+1	+3
	0	−1	0	0	−1	0	0	−1	0	0	−1	−1	0	−2	0	0	−2	0
3	+3	+2	+3	+2	+2	+2	+3	+2	+3	+3	+2	+2	+3	+1	+3	+3	+1	+3
	0	−1	0	−1	−1	−1	0	−1	0	0	−1	−1	0	−2	0	0	−2	0
4	+3	+2	+3	+3	+2	+3	+3	+1	+2	+3	+2	+3	+3	+1	+3	+3	+1	+3
	0	−1	0	0	−1	0	0	−2	−1	0	−1	0	0	−2	0	0	−2	0

[1] S=single sample; C=composite sample. The numbers 12 and 24 equal the time in hours after exposure that samples were taken.

+=positive; −=negative.

fecal matter of all of the mice. On both spherule tests, all plates yielded positive growth of *C. immitis*. Upon reversion to the use of *C. immitis* arthrospores, the result of the first test yielded 25 positive plates and 5 negative plates. The five negative plates all came from the same mouse. The next test yielded the same results, except that the negative plates came from a different mouse. During the remainder of the experiment, all of the plates yielded positive growth of *C. immitis*.

Third Experiment

The following experiment was designed to include individual fecal samples taken directly from the mice to eliminate any chance of contamination of the feces due to the mice dripping contaminated water from their mouths after drinking. Sixteen glass animal cages and drinking bottles were prepared as in the preceding experiments. Into these were placed 12 white mice and 4 wild deer mice (*Peromyscus* sp.) These animals were fed, but kept from water for 24 hours. Each drinking tube was filled with 10 ml. of a heavy aqueous suspension of coccidioidal arthrospores, and the mice were allowed access to this water for 3 hours. The bottles were then withdrawn and no other water given to the mice.

Twelve hours after exposure each mouse was forced to emit a single piece of feces. Twelve hours after this sample was taken, each mouse was forced to emit another single piece of feces. At this time, a composite sample of the cage droppings was taken, the cage was cleaned and sterilized, and the mice again subjected to arthrospore contaminated water. This was repeated for 3 days. Samples were taken 12 and 24 hours after exposure.

On the fourth, fifth, and sixth days, the mice were given water containing the macerated tissues, lungs, liver, diaphragm, and spleen of mice which had been infected with *C. immitis*. The presence of spherules in the water was confirmed by microscopic examination, and also by re-inoculation into other mice and by re-isolation of the vegetative state of *C. immitis*. The mice were subjected to the same type of treatment given to them when the arthrospores were used. All fecal samples were plated on cycloheximide medium as soon as they were taken from the animals; each sample was plated on three different plates.

Results

C. immitis was isolated on at least one plate from each fecal sample at all times. A total of 648 plates was made from the fecal samples of the experimental animals, of which 504, or 77.7 percent, were positive for *C. immitis*. A total of 216 plates was made for the fecal samples of the wild rodents, of which 174, or 80.5 percent, were positive (see table).

Conclusions

1. *C. immitis* arthrospores, when fed to mice, survive passage through the digestive tract and, in most cases, can be isolated from the feces.
2. *C. immitis* was recovered from the feces of mice fed suspensions of spherules and endospores.
3. Constant feeding of *C. immitis*, either as arthrospores or spherules, fails to produce any coccidioidal infection in mice.
4. There is a possibility that *C. immitis* may be disseminated in soils by fecal droppings of predatory animals who have fed on infected rodents. Since *C. immitis* passes through the intestinal tract of rodents unharmed, it is reasonable to assume that it passes through the intestinal tract of predatory animals in a viable condition.

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Measuring Reader Comprehension Of a Preschool Pamphlet

By MARIE FORD, M.P.H., and EVELYN E. HARTMAN, M.D., M.S.

A RECENT ADDITION to the health education material of the Minnesota Department of Health is a brief, easy-to-read brochure titled "Getting Your Child Ready for School" (*1*). There is nothing novel in the concept of a pamphlet for parents with preschool children that carries the same kind of health message as does a personal visit from health workers to parents. What singles out this pamphlet for special attention are the pretesting techniques applied in the evaluation of the material before its publication.

Greenberg and associates (*2*) point out that no matter how satisfactorily a piece of literature might appear to fulfill its intended goals, there still remains the need for adequate testing. Preferably, this testing should be done in advance of publication, for, as Knutson (*3*) states, by pretesting our materials while they are in rough form, we can find out whether they make good sense to the intended reader whose experiences may differ from our own. Such tests are a means of obtaining the other man's perception or interpretation of the message so that changes can be made to take into account his pattern of understanding and his way of life.

Carefully prepared material in the health pamphlet was tested by the Minnesota Department of Health on a homogeneous group of mothers. We wished to learn to what extent mothers could acquire and retain information from the text. To do this, we needed to measure the difference in knowledge between a group of mothers who had received the preliminary material and a comparable group who had not received it. The technique was an adaption of a testing method described by Ford and Stief in the preparation of a pamphlet on the nutritional importance of milk (*4*).

The various steps in pretesting to be described in this report are not to be considered a substitute for program evaluation. Knowledge, as reflected in the ability to give a correct answer, is a necessary first step in effective health education, but the best criteria for determining success are desirable changes in behavior among those to whom the program is directed.

Mrs. Ford, a former magazine editor and journalist, has, since 1949, been health education consultant in the section of public health education, Minnesota Department of Health. She is a graduate of the University of Minnesota, where she also obtained her degree in public health.

Dr. Hartman, formerly with the Minneapolis Health Department as a maternal and child health physician, has, since February 1953, been pediatric consultant in the section of maternal and child health, Minnesota Department of Health. She took her master's degree in pediatrics at the University of Minnesota and her medical training at the University of Helsinki, Finland.

The Editorial Approach

Health as it relates to the individual child, rather than health for health's sake, was the

theme of the pamphlet, "Getting Your Child Ready for School."

One section stressed the contribution of parents and others in the emotional growth and development of the child. Specific reasons why the child should have physical and dental examination were presented in another. Another section was devoted to immunization, and another to the need for sound health practices and habits. Special emphasis was given to the need for training in safe behavior to reduce accident morbidity and mortality among children, because accidents are the leading cause of death among Minnesota children. Statistics had also indicated the need for emphasis on nutrition education and sound dietary practices. An effort was made to show how home and school work together for the protection of every child.

Stressing these topics, it was believed, would reinforce the direct health teaching of physicians and other health workers.

Testing for Readability

The pamphlet was intended for broad, general distribution among young mothers with small children about to start school. Since the material should be easy to read and as interesting as possible, an informal style was adopted. Emphasis was placed on short sentences and 1-syllable words directed to the individual mother and her child.

After the material had been written, a simplification of the Flesch reading ease formula (*5*) was applied to it as a yardstick for readability. The reading ease score was determined by the relationship between the number of 1-syllable words to the average sentence length in 100-word samples. The human interest score represented the ratio between personal words and personal sentences in 100-word samples. The same 100-word samples were used for both scores.

The formula was applied to the first 100 words on the first page of the typewritten manuscript, to the second 100 words on the second page, and to the last 100 words on the third page. This order was repeated for the remaining pages, to give a 900-word sample from approximately 1,800 words. The scores for the combined sample were averaged.

The material scored 75 on the Flesch scale for reading ease. A score of 70 to 80 is rated "fairly easy reading." It is comparable to the sixth grade educational level. Although 85 percent of Minnesota's adult population have had at least 6 years of schooling according to the 1950 census reports (*6*), it is not certain whether their educational level reflects their reading ability. However, indication that this level was attained was valuable for testing purposes, since the material was to be understandable to most mothers.

On the human interest scale, the material was rated a score of 60. A score of 40 to 60 is considered "highly interesting." Since the scores for word samples were within the ranges of "fairly easy reading" and "highly interesting," there was no need to revise individual portions of the basic material to increase reading ease or human interest. The average sentence length was 13 words, with an average of 75 1-syllable words in each 100-word sample. The average percentage of personal words was 12. The average percentage of personal sentences was 50.

Preparation of the Questionnaire

A questionnaire based on the material in the pamphlet was constructed to find out whether people would understand and correctly interpret the information. The questionnaire would be given to two groups of women, one composed of those who had seen the material and the other of those who had not. Differences in scores between the two groups could provide valuable clues as to the usefulness of the material to potential readers.

Ten multiple-choice questions were constructed to cover the basic subject matter in the draft of the pamphlet. The questions were arranged in the order in which the topics appeared. Each question had 4 alternative answers. Correctness was based on positive statements made in the text. The order of the alternative choices was determined by chance, according to a table of random numbers. The questionnaire also contained five additional questions on education, family size, and other data for statistical analysis. Respondents did not sign their names.

The questionnaire was tested on 2 pilot groups of 50 women each who had not seen the material. Analysis of replies led to a revision of the questionnaire for greater clarification. This revised form was then tested on 2 other pilot groups of 10 who had seen the draft pamphlet and 10 who had not. The former scored higher than the latter, and the differences in the scores were statistically significant in the expected direction.

This exploratory research served a dual purpose:

In the first place, it made it possible to test the effectiveness of the instrument which would be used to measure the information impact of the pamphlet material.

And secondly, responses to the questionnaire pointed up areas where additional editorial emphasis was needed in the pamphlet. The answers were useful in much the same way that the direct interview approach reveals basic attitudes and prejudices.

For example, so many people believe that a child should never be allowed to eat between meals that we developed a brief section on good snack foods for hungry boys and girls. It began with the sentence:

"It's all right for him to have a snack when he comes home from school or before he goes to bed."

Many people had also answered the question from which this statement was developed by saying that a child should always be made to clean up his plate. That alternative answer led to this positive statement in the section of the pamphlet on good food habits and how they grow:

"When you force, urge, or coax him to clean up his plate, he becomes the center of attention. He likes it! What began as a whim may become a fixed habit."

The number of correct responses to questions such as the one on the diseases against which children should be immunized was a tribute to the educational activities of many persons and many agencies over a period of many years. But the fact that incorrect choices were made indicated the need for continued educational effort. Negative answers were also a justification for including information on simple health habits, information which one might assume to be common knowledge.

Selection of the Sample

For the study, we sought a group of mothers whose children would soon begin their schooling. We desired such a group in order to eliminate as much as possible the factor of previous exposure to the ideas in the pamphlet. Likewise, we preferred mothers who were the least likely to have attended well-child clinics or preschool roundups, or to have had the advice of pediatricians. Working mothers with young children in day-care centers seemed the most likely to have these qualifications.

After consultation with the Minnesota State Department of Public Welfare, 4 nurseries, similar in size of enrollment and other factors, were selected from among the 28 facilities of this kind in Minneapolis. Each center was located in a neighborhood of families living on relatively low earnings. The mothers were mostly factory or clerical workers.

Copies of the mimeographed text of the pamphlet were taken by health department workers to each center on a Friday afternoon at the time when parents called for their children. Every second parent was asked to take the material home. The child's mother was requested to read it over the weekend, but she was not told that the mothers would be tested at a later date. On Monday afternoon at the same time, the questionnaire was given to every adult who came for a child. Questionnaires completed by men, neighbors, or older children were excluded from the subsequent tabulations. These exclusions resulted in experimental and control groups that were not numerically equal in size, but since results were computed in percentages, this difference was considered not important.

All of the women who had been given an opportunity to read the material claimed to have done so, but it was logical to assume that some had read the text more carefully than others. For the purposes of this study, however, they all were classified as "readers." Mothers who had not received the mimeographed material were classified as "nonreaders." A disadvantage in this method is that where the sample

Cumulative percentages of scores of readers and nonreaders in combined sample of 35

Score	Readers			Nonreaders		
	Frequency	Cumulative frequency	Cumulative percentage	Frequency	Cumulative frequency	Cumulative percentage
100	4	4	19			
90 or more	4	8	38			
80 or more	7	15	71	6	6	43
70 or more	5	20	95	2	8	57
60 or more	0	20	95	3	11	79
50 or more	1	21	100	1	12	86
40 or more				0	12	86
30 or more				1	13	93
20 or more				1	14	100
Total	21	21	100	14	14	100

is small, a few who claim to have read the material but do so casually or not at all may so dilute the sample that the validity of the results are questionable.

The testing results for each nursery were tabulated to determine whether the experimental and control groups were similar in age, family size, and education, and to discover whether differences in knowledge existed between readers and nonreaders. When it was found that the differences in the characteristics of the experimental and control groups at each of the four centers were not statistically significant, the samples were combined for each group.

Description of the Sample

The combined sample of 21 readers and 14 nonreaders from the 4 nurseries was small, but it had been drawn according to the recognized principles of good sampling. All respondents in the combined sample were working mothers between the ages of 20 to 29. Only two had attended a preschool roundup. The educational level of the group in the sample was comparable to that of the State as a whole, or about 12 years for women in the same age group (*6*). The educational level of the nonreaders was similar to that of the readers. Most of the children were under 5, and two-thirds of the mothers had only 1 child. Since the differences in the variables of age, education, and number and ages of children were not statistically significant, we concluded that the experimental and control groups were similar and representative of the elements considered significant for the purposes of the study.

Readers vs. Nonreaders

The cumulative percentages of scores for readers and nonreaders are shown in the table.

With 100 representing a perfect score, the mean score for readers was 82, and the standard deviation was 12.6. The mean score of nonreaders was 64, with a standard deviation of 18.8. The critical ratio was 3.7. A ratio of this size means that it is improbable such a difference would occur by chance. In other words, readers on the average correctly answered approximately 8 questions, and nonreaders approximately 6 of the 10 questions. The difference was statistically significant in the expected direction.

Nonreaders were consistently below readers in performance level at all scores. No nonreader scored higher than 80, but 38 percent of the readers did. Only 57 percent of the nonreaders scored 70 or higher, in contrast to the 95 percent of the readers who did so; 71 percent of the readers made a score that was equal to or better than the top score for nonreaders. Only 5 percent of the readers scored below 70, but 43 percent of the nonreaders did so.

Findings relative to scores were significant only in terms of responses to all 10 questions. That is, differences in the number of correct responses to individual questions for readers and nonreaders were not statistically significant at the level selected to measure the reliability

of differences. None of the 10 questions in the questionnaire served to discriminate between readers and nonreaders, but 2 of the questions used came close to this level.

In response to the multiple-choice question, "To encourage good food habits in a child, parents should (*a*) make him clean up his plate before he can leave the table; (*b*) coax him to eat the foods they want him to eat; (*c*) keep him from eating between meals; (*d*) eat the same foods they want him to eat," 62 percent of the group of readers and 21 percent of the group of nonreaders answered correctly. The critical ratio was 2.4. (Item *d* was the correct choice.)

In response to the question, "In the winter children should wear warm outer clothing that covers their entire body because: (*a*) they need their energy for growth; (*b*) without such clothing they won't be allowed to go outdoors for recess; (*c*) they will catch cold otherwise; (*d*) they can't play in the snow," 52 percent of the group of readers and 7 percent of the group of nonreaders answered correctly. The critical ratio was 2.8. (In this instance, item *a* was correct in terms of a definite statement made in the pamphlet.)

However, when the responses of readers and nonreaders to these two questions were combined, the results were statistically significant. In combination, the mean percent of correct answers among nonreaders was 14, and among readers, 57 percent. Apparently these two questions in combination were discriminatory ones. More than any of the other questions, they distinguished between readers and nonreaders.

Each one of the group of readers was asked to rate the material as dull, mildly interesting, interesting, or highly interesting. Fifty-seven percent found it highly interesting; 43 percent found it interesting; no one rated it dull or mildly interesting.

Evaluation of the Pamphlet

These protesting techniques contributed materially to increased pamphlet effectiveness. The fact that a small sample may produce significant results is an additional recommendation for the use of the pretesting method.

Statistical analysis of data provided evidence that readers of the material were better informed on the subject matter than nonreaders. The experimental and control groups were homogeneous, so differences could only be explained on the basis of the impact of the text. The findings indicated that the text would be of value to the special audience for which it was designed.

There was evidence that readers with an educational level of about 12 years found interest in information that was written at the sixth grade level, suggesting that there is not necessarily a loss of readership when material for general distribution is written for a level that is considerably below that of a portion of the intended audience, provided that the material is related to their interests and problems.

Research of this kind has proved its worth in the production of health education materials. Such methods make it possible to test material at a point where changes can still be made. They are ones that anyone with a limited knowledge of statistical techniques can apply with a minimum expenditure of time and effort, and in terms of more effective public health literature, it is well worth the investment of both.

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A Preliminary Report

Effect of a Combination of SO_2 and H_2SO_4 On Guinea Pigs

By MARY O. AMDUR, Ph.D.

RESEARCH of the past 4 years has shown that low concentrations of either sulfuric acid mist alone (*1*) or sulfur dioxide alone (*2*) cause a reflex production of shallow, rapid respiration in normal humans. Since both these substances can, and as a matter of fact often do, occur together, the obvious next step was to test the effect of a combination of the two. This was best done first on animals in which lung pathology as well as respiratory effects could be studied. This paper reports the results of these very brief preliminary studies on guinea pigs.

In the experiments using humans, the concentrations of sulfur dioxide or sulfuric acid mist varied in order of magnitude from those occurring in the atmosphere during such disasters as the London fog to those considered as safe levels for routine exposures in industry. In the case of sulfur dioxide, the average concentration for the day at the height of the London fog was 1.3 p.p.m. (see *Public Health Reports*, May 1953, p. 474). This is about 10 times the amount usually found in the London atmosphere and about one-tenth of the maximum allowable concentration for industry (10 p.p.m.). In the case of sulfuric acid mist, atmospheric concentrations of 0.25–0.4 mg. per cu.m. have been reported and the industrial level is 1 mg. per cu.m.

In the experiments using guinea pigs, concentrations much higher than these are used since the guinea pig is considerably more resistant to these substances than are humans. Levels 8 to 9 times the allowable industrial concentrations were used in the work reported here. These levels were chosen so that neither substance present alone would cause appreciable damage to the animals for the period of the exposure used.

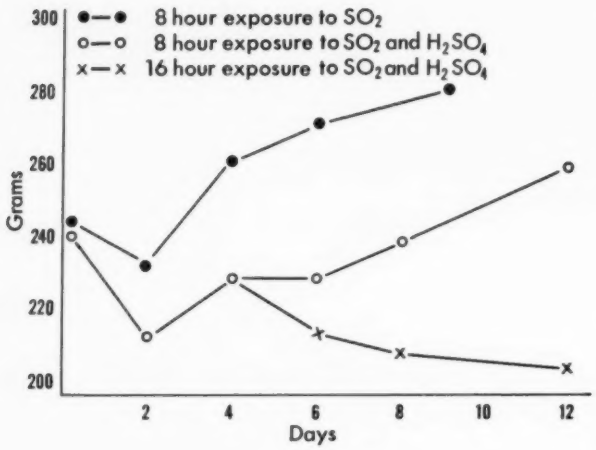
Dr. Amdur, research associate in the department of industrial hygiene, School of Public Health of Harvard University, who has been engaged in a series of studies on the effect on man and animals of sulfur dioxide and of sulfuric acid mist, presented this preliminary report on the effect of a combination of the two on guinea pigs, at the meeting in Boston of the American Association for the Advancement of Science, December 29, 1953.

Experimental Procedure

The apparatus was similar to that used in previous work on sulfuric acid mist alone (*1*, *3*). The mist was generated by warming concentrated sulfuric acid in a three-necked flask. Sulfur dioxide from a tank was metered into one neck of the flask while compressed air entering the second neck swept the vapors out of the flask through the third neck which was connected to the main air stream entering a 2-cu. ft. exposure chamber, made of corrosion-resistant materials (A).

For sampling the air in the chamber for sulfuric acid mist and sulfur dioxide, a membrane filter (B) and a sintered glass bubbler were connected in series. The sulfuric acid mist particles, which had a mean diameter of 1 micron, were caught by the filter. This filter was then washed with water and the conductivity of the resulting solution was measured. Concentration was calculated from a curve prepared from

Figure 1. Growth of guinea pigs following exposure to 89 p.p.m. of sulfur dioxide alone and to 89 p.p.m. of sulfur dioxide with the addition of 8 mg. per cu. m. of sulfuric acid mist.



standard sulfuric acid solutions. A sensitive fuchsin-formaldehyde colorimetric reagent (*4*) failed to indicate the presence of sulfur dioxide on the aerosol as collected. The sulfur dioxide, which passed the membrane filter (B), was trapped in the hydrogen peroxide-sulfuric acid reagent of Thomas and Abersold (*5*) and determined by conductivity. On several samples, the sulfur dioxide was determined by the iodine method. This checked the concentration found by conductivity showing that no appreciable quantity of the sulfur gas was present as sulfur trioxide.

In these experiments, 8 guinea pigs were exposed for 8 hours to a combination of 8 mg. per cu.m. of sulfuric acid mist and 89 p.p.m. of sulfur dioxide. Two of these animals were re-exposed 4 days later to the same concentrations for another 8 hours. Control data on the effects of exposure to sulfuric acid mist alone were readily available since in the course of previous work done in the same laboratory (*3*) a total of 68 guinea pigs from the same source had been exposed for 8 hours to 8 mg. sulfuric acid mist per cu. m. and 30 animals had been exposed to this concentration for 72 hours.

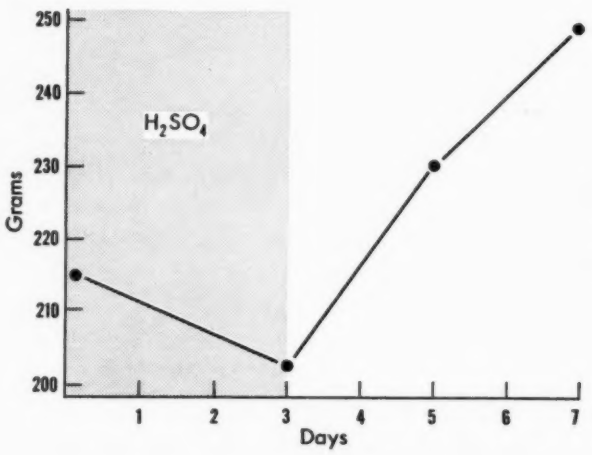
Due to various limiting factors, only 4 guinea pigs were exposed to 89 p.p.m. of sulfur dioxide uncontaminated by sulfuric acid mist. The response of the guinea pig to this gas has been, however, well documented by Weedon, Hartzell, and Setterstrom from the Boyce Thompson Institute (*6*). The response of the 4 animals exposed was as expected from the data reported.

Results

As criteria of damage, growth curves, respiratory response, and lung pathology were used. These combined criteria show that the effect of the combination was much more marked than the effect of either sulfuric acid mist or sulfur dioxide alone at the same concentrations.

Figure 1 shows the growth curves for animals exposed to sulfur dioxide alone and to the combination. In all cases the weight had fallen off the day following exposure. In the case of sulfur dioxide alone, growth was quickly resumed. When both sulfuric acid mist and sulfur dioxide were present, growth was slow to resume. The two animals that had been re-exposed ceased to grow entirely during the period of observation following re-exposure. The effect of the combination on growth is definitely greater than the effect of sulfuric acid mist alone, since in previous experiments even the survivors of LD_{50} concentrations (18 mg. per cu. m., a dose lethal to 50 percent of the animals exposed) or of 72-hour exposures to 8 mg. per cu. m. resumed growth following exposure. Figure 2 shows the growth curve of 12 animals exposed to 8 mg. sulfuric acid mist per cu. m.

Figure 2. Growth of guinea pigs following exposure to 8 mg. per cu. m. of sulfuric acid mist alone for 72 hours.



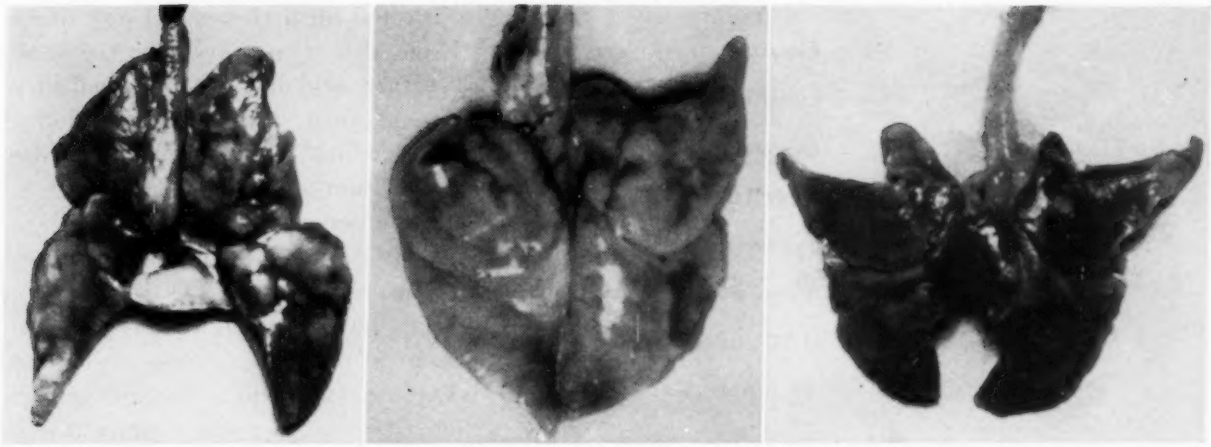


Figure 3. Lungs of three guinea pigs exposed for 8 hours to 89 p.p.m. of sulfur dioxide.

for 72 hours. The weight lost during exposure was quickly regained.

The lung pathology produced by the combination was much more extensive than that resulting from the same exposure to sulfuric acid mist alone or sulfur dioxide alone at the same dose levels. The lungs of animals exposed for 8 hours to 8 mg. per cu. m. of sulfuric acid mist alone (*3*) showed some damage with occasional areas of consolidation mostly limited to the hilar regions. Lungs of animals exposed to 89 p.p.m. of sulfur dioxide alone showed some damage, including pinpoint hemorrhages and occasional small areas of consolidation. Figure 3 shows the lungs of three of these animals. In neither case, however, was the lung damage severe.

Figure 4 shows the lungs of three animals exposed to the combination of sulfuric acid mist and sulfur dioxide for 8 hours. The lungs in all cases showed large areas of complete consolidation and hepatization involving entire lobes. Figure 5 shows the lung of one of the animals that was re-exposed for a second 8-hour period 4 days after the initial exposure. In this case hemorrhage and consolidation are widespread throughout the whole lung. The general ill health of these animals was very likely related to the presence of this extensive lung damage.

When guinea pigs are exposed to 8 mg. per cu. m. of sulfuric acid mist alone, there are no noticeable respiratory effects. This is true for exposures up to 72 hours. Grossly, the animals breathe and behave in a normal manner. At 89 p.p.m. of sulfur dioxide, the animals appear restless and annoyed when the gas is first turned on, but this passes in 5 to 10 minutes and they appear to become accustomed to it. Weedon and co-workers (*6*) report that at 150 p.p.m. of

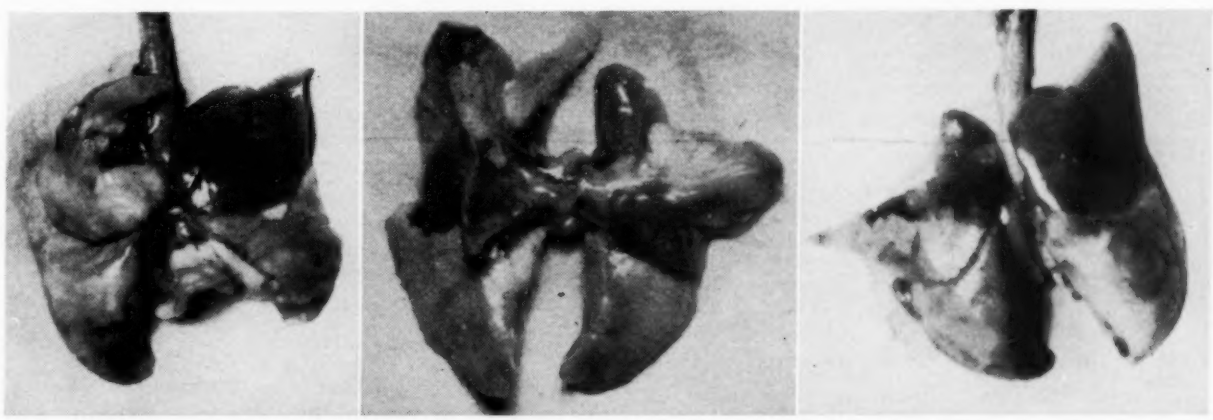


Figure 4. Lungs of three guinea pigs exposed for 8 hours to 89 p.p.m. of sulfur dioxide and 8 mg. per cu. m. of sulfuric acid mist.

Figure 5. Lung of guinea pig after 16-hour exposure to 8 mg. per cu. m. H_2SO_4 and 89 p.p.m. SO_2

sulfur dioxide severe respiratory distress does not set in until the animals have been exposed for 48 hours, and that even at 296 p.p.m. evidence of dyspnea only became apparent during the second day of exposure.

When these two substances are given together at the concentrations used, signs of respiratory distress become apparent within the first hour of exposure and become progressively worse as the exposure continues. Frothy fluid appears in the nose and mouth and dyspnea is very pronounced. Even more surprising is the fact that this labored breathing continues for 24 to 48 hours after the animals have been removed from the exposure chamber. At concentrations of sulfuric acid mist alone capable of killing 50 percent or more of the animals in 8 hours, those that survived were breathing normally within 2 hours after the exposure ended except in a few rare instances.

Discussion

None of the animals in these experiments died spontaneously either during exposure or in the short period of observation following exposure. Both the depressed growth curves and the severe lung pathology, however, indicated that considerable damage had occurred. Both these factors were markedly aggravated by the repeated exposure.

If a quantity of sulfuric acid mist equivalent to 89 p.p.m. of sulfur dioxide were given, guinea pigs would be dead within an hour or less of laryngeal spasm. With three times this concentration of sulfur dioxide alone, however, breathing is not affected until the second day of exposure. From this it appears that the small amount of sulfuric acid mist, which is ineffective alone, when combined with a concentration of sulfur dioxide, which is also ineffective alone, produces a very marked respiratory response.

Since only one concentration of sulfuric acid mist and sulfur dioxide was used in these experiments, the results must be regarded as purely preliminary. Further studies using different concentration combinations are needed before an explanation of the nature of the joint toxic action of these two compounds can be postulated.

Summary

It has been shown that for 8 mg. per cu. m. of sulfuric acid mist and 89 p.p.m. of sulfur dioxide given in combination to guinea pigs the effect on growth, lung pathology, and respiration are much more marked than would be predicted from the use of either alone.

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Laboratory Research, Field Investigation, And Training Program

of the Robert A. Taft Sanitary Engineering Center at Cincinnati, Ohio

THE Public Health Service's Robert A. Taft Sanitary Engineering Center (until recently the Environmental Health Center) in Cincinnati, Ohio, is dedicated to research, field investigations, and training in the sanitary sciences as related to man's contact with air, water, food, wastes, and ionizing radiations. It is the only laboratory in the Nation to attempt a coordinated study of the health significance of physical, chemical, and biological forces in the environment.

Dramatic population changes, growing industrialization, increasing use of atomic energy, and other factors in modern civilization are making it daily more important that the effects of the environment on the Nation's health be understood and that the Nation develop and apply the necessary control techniques to assure a healthful environment for its population.

In recognition of these needs, the 80th Congress authorized the construction of a new headquarters and laboratory building, designed to meet the specialized and technical requirements of the scientists and engineers engaged in the center's research and training program. In the past, men at the Cincinnati station, even though working in widely scattered and inadequate facilities, contributed materially to the development of methods, techniques, and instrumentation to assure safe supplies of milk and drinking water, safe handling of food at eating places, and abatement of water pollution.

The program has steadily broadened in scope. To meet present needs, the center is turning its attention to such problems as waterborne virus diseases (infectious hepatitis, for example); waterborne toxins generated by algal growths; hazardous chemicals in the water supply and in the atmosphere; control of environmental radiation hazards which have been accentuated by the growth of the atomic energy industry; and the development of rapid, automatic and economical means for detecting and measuring contaminants in air and water by use of modern electronic techniques, such as the use of infrared waves to "fingerprint" bacteria.

One study which should repay the cost of investigation many times over is the application of a molecular filter which strains out all bacteria from drinking water. This filter offers major economies to public waterworks in providing a more rapid and economical method of examining water for bacteria. It can be used to insure the safety of drinking water taken from wells, lakes, and springs.

Better methods for detecting, controlling, and remedying water pollution have long been pursued by the center. Some lines of this endeavor have been the development of new and improved analytical techniques; studies of sewage and industrial waste treatment processes; studies of the ability of streams to purify themselves naturally. A systematic study of industrial wastes, in collaboration with industry as-

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This material was furnished by the Robert A. Taft Sanitary Engineering Center of the Public Health Service. The center is under the direction of Vernon G. MacKenzie, officer in charge.

To evaluate toxicity of specific types of wastes to fish or other aquatic life, biologists at the center place fish in a group of jars containing progressively decreasing concentrations of test material. The fish are observed for various periods to determine percentage surviving at each concentration.

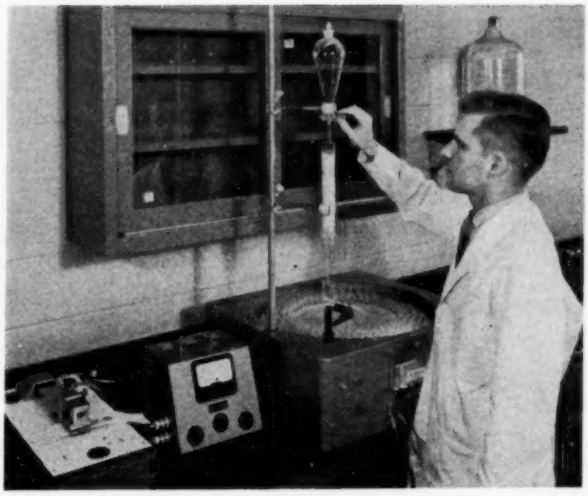
High-volume air sampler collects particles of solid matter from air drawn through fiber glass mat on front of sampler. Particulate matter collected by these instruments in 22 communities is sent to the center for analyses of organic and inorganic content, bacteria, pollens, proteins, and radioactivity.

sociations, individual industrial plants, the National Technical Task Committee on Industrial Wastes, and others, has been a major responsibility of the center. A series of industrial waste guides has been published for technical use.

Of particular professional interest is the center's training program for State and local health workers in advanced sanitation and radiological health subjects. During the past 5 years, 160 training courses have been conducted. They have been attended by more than 6,300 public health specialists from the 48 States and many foreign countries. The new laboratories are equipped with unique "classroom labs" for the accommodation of the trainees. These courses have proved invaluable in providing the center with another way of making research results available to sanitary engineers and allied professional workers for practical and widespread use in controlling health hazards.

Intensive research into environmental factors is new in the health field. There are many unknowns to challenge the investigator and many methods of approach to them. Important by-products of research in the Cincinnati labora-

Left: Training courses at the center give health workers knowledge and techniques to solve environmental health problems. Right: Trainees discuss chemistry of ionizing radiations as related to public health.



Automatic fractionator being used to separate a mixture of bacterial toxins to obtain specific toxins responsible for food poisoning symptoms.

tories may, in the future, reveal clues to the mysteries of the present day "killers" and "cripplers"—poliomyelitis, heart disease, and cancer. What is the role of the water we drink, the air we breathe, and the food we eat in relation to these diseases?

Research Projects

Below is a list of the research and investigation projects which the Sanitary Engineering Center is currently conducting or has recently completed.

Methodology

Appraisal of sanitary engineering research.

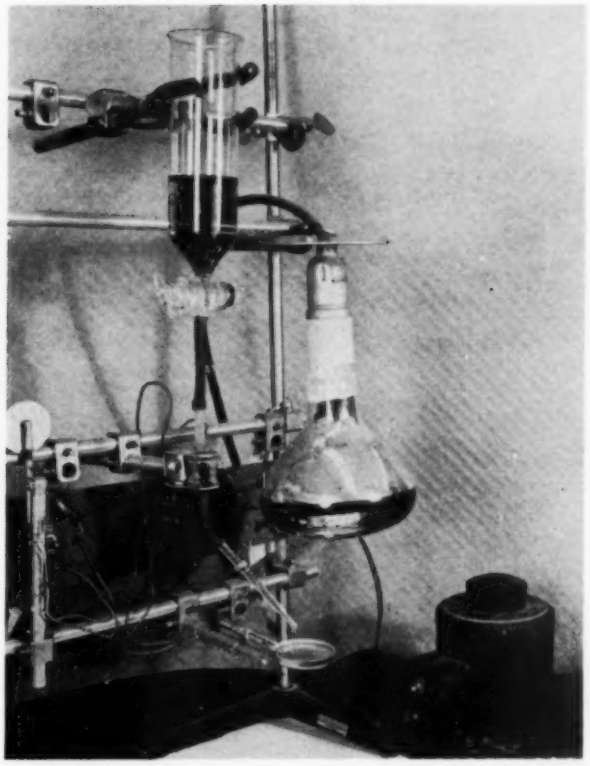
Development of differential media for the enumeration of coliform organisms in water, air, milk, and shellfish, using membrane filter techniques.

Application of infrared absorption spectrophotometry to the rapid identification of microorganisms.

Adaptation of tissue cultures from human and animal tissues for the investigation of sanitation practices as related to the control of infectious hepatitis.

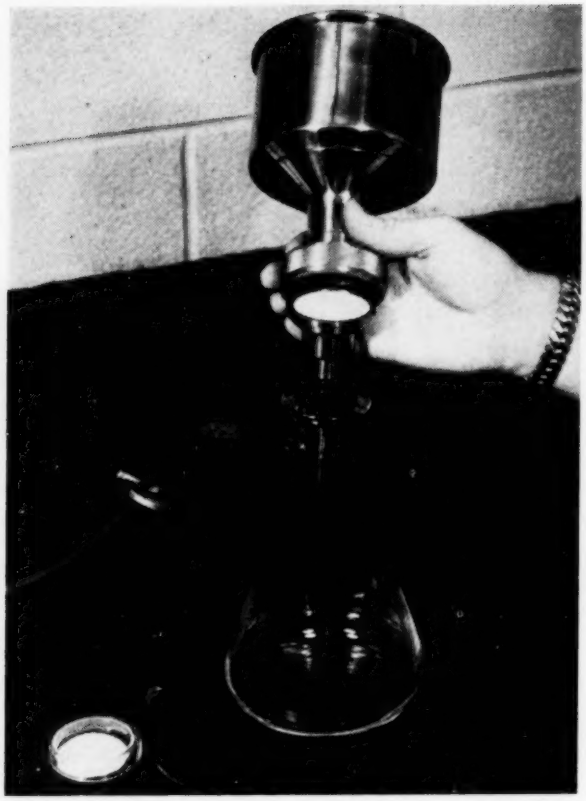
Analysis of virus-infected cells by means of polaroid color-translating ultraviolet microscopy and microspectrophotometry.

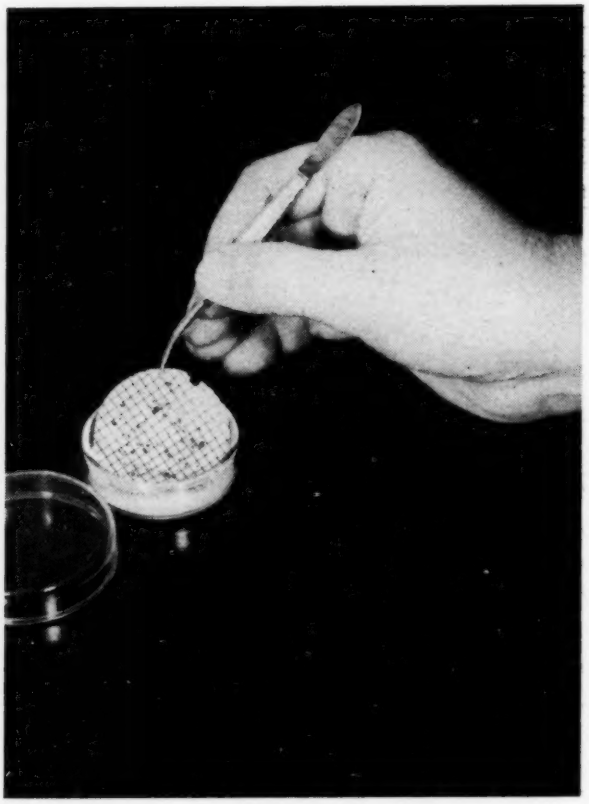
Evaluation of media for the maximum produc-



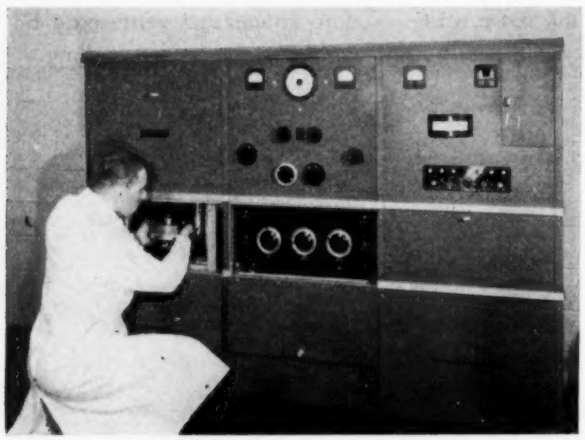
Measuring radioactivity of water requires great concentration of material by evaporation. Water from sample flows into small pan under heat lamp. When enough water has entered, the pan tips, shutting off the flow by breaking an electrical circuit. After some water has evaporated, pan is raised automatically, closing circuit, and admitting more water. Large volumes of water may be evaporated quickly with a minimum of handling.

Carbon filters concentrate minute quantities of organic materials from water. Such materials often causing taste and odor in water may be identified by analyzing concentrates.





Membrane filter allows rapid, accurate counting and identification of bacteria in water. Water poured in at top passes through filter. Bacteria are caught by filter, which is removed and placed on pad of nutrient material so that bacteria may develop into colonies. After incubation, each organism trapped on membrane filter grows into a visible colony. These can be counted to determine number of bacteria in water sample.



Ultracentrifuge.

tion of fungi and inhibition of bacteria as related to study of the role of fungi in environmental health.

Development of a continuous indicating and recording instrument for measuring the dissolved oxygen content of industrial wastes and surface waters.

Development of chemical and spectrographic analytical methods for the microquantitative determination of organic and inorganic substances in water and air.

Study of factors affecting adsorption and elution of organic materials from carbon filters.

Study of the application of disinfecting procedures to bedding and upholstery materials.

Assessment of effectiveness of germicides under various use conditions: quaternary ammonium compounds, silver containing substances, and iodine.

Air Pollution

Collection, separation, and analysis of particulate impurities in the air (sampling stations in 23 communities in the United States and Alaska).

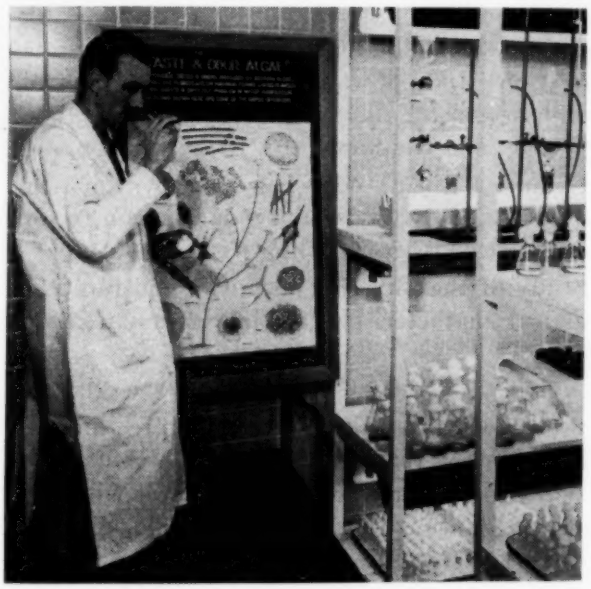
International Joint Commission (United States Section) study of air pollution in the Detroit-Windsor area (Detroit, Mich.).

Review of available information on the public health aspects of community air pollution.

Radioactivity survey of the dust, air, rain, and snow in the atmosphere over Cincinnati.

Food Sanitation

Biochemical detection of toxins causing food poisoning.



Single species of algae, which may cause taste and odor problems, being isolated and cultivated in the laboratory to develop new and improved control methods.

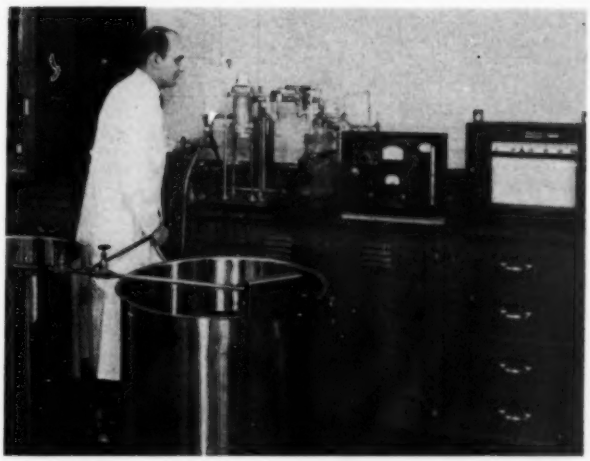
Microbiological and immunological methods for rapid detection of food-poisoning bacteria.

Study of the pollution and natural purification of shellfish in aquatic environments (Pensacola, Fla.).

Sanitary evaluation of commercial methods of harvesting, processing, and marketing shellfish (Pensacola, Fla.).

Improvement of phosphatase and other biochemical and microbiological measures for the safety of milk and processed foods.

Evaluation of the effectiveness of commercial milk pasteurization on the destruction of the causative agent of Q fever; cooperative project with University of California (Davis, Calif.).



Apparatus gives a continuous record of dissolved oxygen content of surface waters in lakes and streams, an important indicator of their suitability for various uses.

Waste Disposal

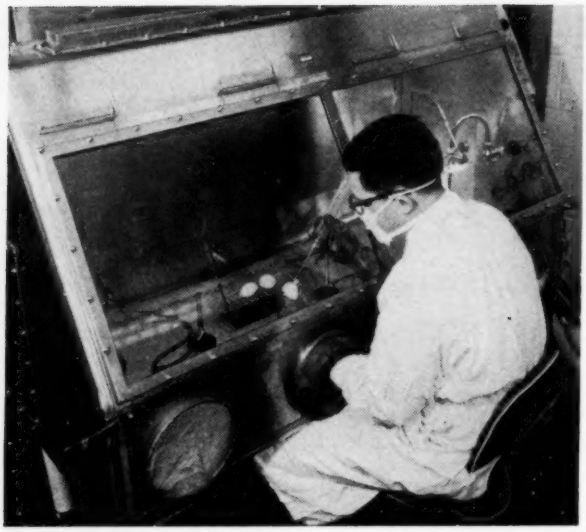
Studies of industrial waste sources, characteristics, and corrective measures.

Evaluation of the effectiveness of selected municipal sewage treatment processes.

Studies of subsurface household sewage disposal systems.

Methods for the treatment of radioactive wastes; cooperative project with Atomic Energy Commission (Los Alamos, N. Mex., Oak Ridge, Tenn., and Cincinnati, Ohio).

Part of equipment used in studying persistence of oils in water. Oils are mixed with water in the carboy and mixture is agitated by the recirculating pump. Rate of oil decomposition is checked periodically by analyzing samples for oil content and by measuring decomposition gases which are absorbed in the liquids in the bottles.



Virologist working under specially designed safety hood inoculates infectious virus into fertile eggs, where it will multiply.

Application of physical, chemical, and biological methods to the treatment of aircraft cleaning wastes and determination of their toxicity to fish before and after treatment.

Water Pollution

The exploration and evaluation of biological indexes of water pollution.

Bioassay studies to determine the toxicity to fishes of complex cyanides, beryllium, uranium, and less common metals.

Basic studies in fish toxicology and physiology as related to water pollution; cooperative project with Oregon State College (Corvallis, Oreg.).

Investigation of the toxicity to fishes of selected dieldrin formulations and of the surface runoff from treated areas.

The persistence of lignin, neutral hydrocarbons, and other substances in surface waters.

Studies of the survival of Coxsackie virus in polluted waters.

Evaluation of mold populations in sewage and polluted streams in search of natural reservoirs of pathogenic fungi.

Studies on the relation of molds common in sewage, polluted water, and sewage treatment plants to the degradation of suspended and dissolved solids and on the role of fungi in natural purification of streams.

Studies of the relationship between quality of natural swimming waters and health.

Exploratory study of the effects of detergents on sewage treatment and water purification.

Roanoke River water pollution study.

International Joint Commission (United States Section) study of water pollution in the Detroit and Niagara Falls areas (Detroit, Mich., and Buffalo and Niagara Falls, N. Y.).

Columbia River studies concerned with observable effects of radioactivity on a stream receiving nuclear reactor cooling waters.

Study of the physical, chemical, and radiobiological characteristics of the Savannah River.

Water Supply

Study of physical and carrier precipitation methods for removing radioactive contamination from water; cooperative project with Oak Ridge National Laboratory (Oak Ridge, Tenn.).

Study of the suitability of the Scioto River and adjacent ground water as possible sources of drinking water supply for the Atomic Energy Commission plant near Piketon, Ohio (Waverly, Ohio).

Exploratory studies on the survival of *Histoplasma capsulatum* in water.

Effects of chlorine disinfection on the inactivation of Coxsackie virus in water.

Identification and culturing of organisms (algae) producing nuisance conditions in water supplies and the development and evaluation of control procedures.

Determination of the chemical nature and sources of organic substances in industrial wastes, surface waters, and water supplies.

Fiftieth Anniversary

The National Tuberculosis Association

By JAMES E. PERKINS, M.D., Dr.P.H.

A SIGNIFICANT page in the history of public health in the United States was written on June 6, 1904, when a group of medical and nonmedical citizens formed the National Association for the Study and Prevention of Tuberculosis. The first national voluntary health agency devoted to the control of a specific public health problem, its stated purposes were the study of tuberculosis in all its forms and relations; the dissemination of knowledge about the causes, treatment, and prevention of tuberculosis; and the encouragement of the prevention and scientific treatment of tuberculosis.

The people who met on that date in Atlantic City represented every section of the country. They carried back to their own localities the determination to put into action tuberculosis control programs at home. Through specific programs determined in each locality to meet the most pressing needs of that locality, they envisioned a vast network of aroused citizens who would carry on a nationwide fight.

Many of the outstanding medical men of that day had part in the founding of the National Tuberculosis Association. Among these were William Osler, William H. Welch, Hermann M. Biggs, and Edward L. Trudeau. The actual establishment and the organizational structure, however, were brought about chiefly by Lawrence F. Flick (1856–1938) of Philadelphia. He was somewhat stubborn, farsighted, and a devoted crusader. He had established in 1892 in Pennsylvania the first local tuberculosis association and had been mainly responsible for the establishment in Philadelphia of the Henry Phipps Institute for the study, treatment, and prevention of tuberculosis in 1903.

The decision to establish the national society was made at an earlier meeting held in Philadelphia on March 28, 1904, in connection with the initiation by the Phipps Institute of a series of lectures on tuberculosis by distinguished physicians from foreign countries. NTA and the Phipps Institute have been closely allied ever since.

A meeting of the committee appointed to work out the details for the establishment of the new association was held on April 22, 1904, in the Manhattan home of Biggs (1859–1923), then commissioner of the New York City Health Department and later commissioner of the New York State Department of Health. At this meeting the concept of the association's function was broadened to provide for education and social measures and to include nonmedical as well as medical men in its direction. This broadening of concept apparently was a response to criticism by Edward T. Devine, general secretary of the Charity Organization Society of New York City, who had complained that the March 28 meeting had been attended only by physicians and also that the discussions indicated the new society might not

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Dr. Perkins, formerly deputy commissioner of the New York State Department of Health, has been managing director of the National Tuberculosis Association since January 1948. He has been an active participant in many overseas health task forces, a member of the United States delegation to the first World Health Assembly, and serves on the executive committee of the International Union Against Tuberculosis. He writes here on the occasion of NTA's fiftieth anniversary, giving some of its history, its problems and accomplishments, and then stresses the challenge it faces in the future.

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concern itself with stimulating community action but would confine its activities solely to scientific research.

The first president of NTA was Trudeau (1848–1915), who, through his own successful struggle against tuberculosis and his sanatorium and research activities at Saranac Lake, had brought new hope to tuberculosis victims throughout the country. In his presidential address, he stressed the fact that the first and greatest need is education of the people, and through them, education of the state—a basic philosophy of NTA and its affiliated State and local associations ever since. The medical section of the association is named the American Trudeau Society in his honor.

Development of NTA

The development of NTA can be briefly summarized by reviewing the work of four previous managing directors. The first, appointed on January 15, 1905, was Livingston Farrand (1867–1939) who came from a chair in anthropology at Columbia University. He guided the association through its struggling infancy to a healthy and flourishing existence. When Farrand began his activities, the association had 500 members. In the year 1914, when he resigned to become president of the University of Colorado, the association had grown to 2,256. There were 1,200 local associations, 400 dispensaries, 550 sanatoriums and special hospitals, and 250 open-air schools. The NTA budget had increased from around $3,400 to $34,000. Subsequently, he served many years as the president of Cornell University, during which time he was an active member of the Public Health Council of the State of New York.

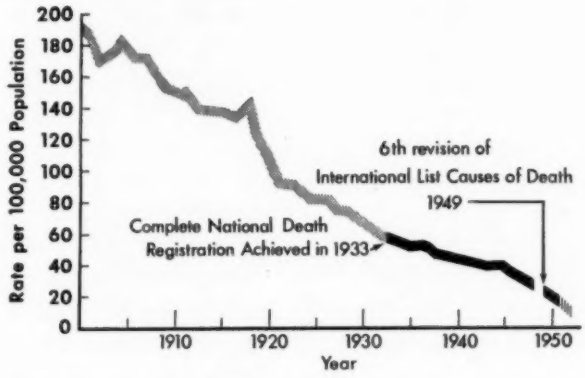
Farrand was succeeded in 1914 by Charles J. Hatfield (1867–1951), director of the Henry Phipps Institute, who served as managing director on a part-time basis for 8 years. His era has been described as that of the expansion of NTA and development of its affiliated associations. With Phillip P. Jacobs and Frederick D. Hopkins, Hatfield, by the end of his term, had seen to it that there was a State association in every State in the Nation to serve as the liaison and coordinating organization between the national office and the hundreds of tuberculosis associations which were springing up in local communities throughout the Nation.

The Christmas Seal sale, shared with the Red Cross from 1910 to 1919, and wholly NTA's from then on, climbed from a mere $3,000 in 1907 to more than $3½ million by 1920. The contractual basis on which the sale is operated by State and local associations (NTA getting only a small percentage) spurred this growth in revenue.

In 1922, Linsly R. Williams (1875–1934), a deputy commissioner of the New York State Department of Health, succeeded Hatfield. During his directorship, an intense application of business principles resulted in continued growth of the Association. An itemized budget for NTA, budget and report forms for State and local associations, and a separate supply service under the direction of the administrative service to finance the manufacture and distribution of supplies were factors in this growth. As the tuberculosis problem became less acute and the funds through the Christmas Seal sale continued to climb, affiliated tuberculosis associations meeting certain criteria were permitted to include campaigns against other diseases.

In 1928, Kendall Emerson, a distinguished orthopedic surgeon, became managing director and served until his retirement in 1947. During his directorship, the Division of Tuberculosis (only recently made part of the Special Health Services Division) was established in the United States Public Health Service, another event of significance in the history of tuberculosis control in the United States. Vast educational and mass X-ray surveys, evaluation of programs of affiliated associations, conferences of tuberculosis workers and conferences on health in colleges, and school press projects initiated under Dr. Emerson's direction are being carried on today. Three thousand local tuberculosis associations with hundreds of thousands of volunteers and over a thousand paid workers, approximately $24 million per year from the Christmas Seal sale, and over half a billion dollars a year expended for official programs of tuberculosis control exclusive of hospital construction have helped to topple the tuberculosis death rate.

Tuberculosis death rates since 1900 in the United States. Complete national death registration achieved in 1933.



NTA and the Official Health Agency

One of the distinctive features of the National Tuberculosis Association has been its close relationship to the official health agencies.

Tuberculosis is a communicable disease, and the control of communicable diseases has always been the legal responsibility and one of the basic functions of the official health agency. The education of the state, stressed by the first president of NTA, has meant primarily the education of the citizen as to the nature and extent of tuberculosis, the measures which can and must be applied to solve this important problem, and the necessity for him to support the establishment of adequate health departments, properly staffed, to carry on the innumerable activities involved in the control of tuberculosis.

Education of the state also has meant experiments or demonstrations conducted in the various communities throughout the country by the tuberculosis associations. These have been demonstrations of programs which seemed to be particularly needed at the time in the given community. They were conducted with the objective being to transfer them to the official agency as soon as it had developed to the point where the function could be assumed.

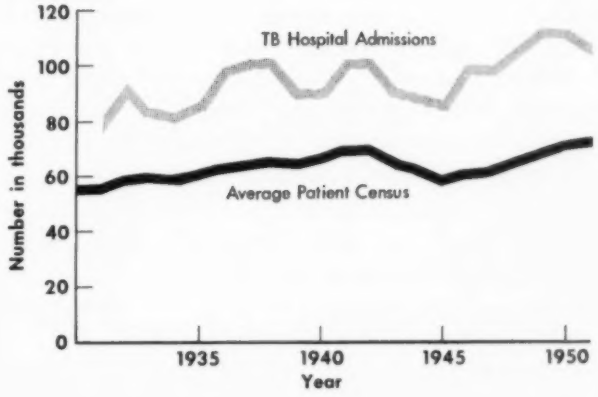
Thus, tuberculosis associations have engaged legitimately in all aspects of the tuberculosis control program which should be, and in most instances ultimately have been, taken over by the official agency. These activities include the operation of tuberculosis clinics, establishment of public health nursing programs, the purchasing and scheduling of mobile X-ray units, the establishment of programs for routinely X-raying all patients admitted to general hospitals, development of social work, vocational guidance, training and placement programs, and many others.

The nature of tuberculosis has also caused the tuberculosis associations from the very beginning to take a broad interest in all of the health and welfare problems of society. Since the prevalence of tuberculosis is related to low living standards, NTA and its affiliates have been concerned with and have attempted to help solve such problems as malnutrition, substandard housing, and inadequate welfare assistance programs.

If NTA is considered more gregarious than some of its fellow national health agencies, these broad interests are responsible. NTA works actively with groups devoted to improving school and college health programs, nursing, medical education, rehabilitation, social welfare, social work, and world health. It is one of the founders of, and has continuously supported, the National Health Council.

No sharp line of demarcation exists between the activities of the voluntary tuberculosis association and those of the official agencies. Both are concerned with the basic programs of tuberculosis control: case finding; case supervision; treatment; rehabilitation; prevention—the building up of resistance to tuberculosis through specific measures, such as BCG immunization of persons undergoing unusual exposure to tuberculosis, and nonspecific means,

Admissions to tuberculosis hospitals and average patient census, continental United States, 1930–51.



such as through improving nutrition; and finally, research. Among the various tools needed to implement each one of these basic programs, education is one of the most important. Education is particularly the function of the voluntary association, especially in the important matter of gaining citizen support for official health and welfare programs.

Since tuberculosis associations engage in all aspects of the tuberculosis control program, the necessity for close working relationships with the official agency is obvious. On the national level, periodic joint staff conferences of NTA and the personnel administering the tuberculosis control program of the Public Health Service provide for this collaboration. In addition, specialists on the staffs of both agencies are directed to keep in close contact with their counterparts in the other agency. Furthermore, the director of the Public Health Service tuberculosis program routinely attends meetings of the executive committee and board of directors of NTA, as does the director of the tuberculosis program of the Veterans Administration. Comparable arrangements for effective liaison between the tuberculosis associations and the official agencies have been established at the State and local levels.

Functions of NTA

NTA maintains the necessary liaison with other national agencies involved directly or indirectly in the program of the control of tuberculosis and promotes international tuberculosis control activities. The national office serves the State and local associations by providing expert consultation service in the various specialized aspects of the program, and the health education and publicity materials needed in their work. To facilitate this function, the national office has the following divisions: health education, public relations, social research, personnel and training, business management, program development, rehabilitation, and Christmas Seal sale. There is, in addition, the Joint Tuberculosis Nursing Advisory Service, administered by the National League for Nursing, but financed entirely by NTA. The two staff members of this service function as staff members of NTA.

A major segment of the work of NTA is that conducted by its medical section—the American Trudeau Society. The society is an integral part of NTA although it has its own constitution, elected officers, executive committee and council, as provided for in NTA bylaws. Over 5,000 physicians belong to the American Trudeau Society, which provides the medical guidance to NTA, is responsible for an extensive medical research program, conducts a program of education of physicians, both undergraduate and postgraduate, and publishes monthly the *American Review of Tuberculosis*. The American Trudeau Society's diagnostic standards are widely accepted as the criteria for classification of tuberculosis patients.

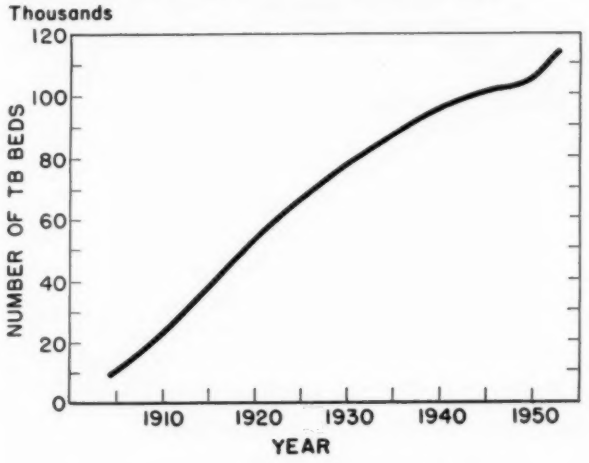
Interrelationships

Coordination of NTA with its affiliated associations is achieved principally through two devices: the composition of the NTA board of directors and the Christmas Seal sale contract. The board of directors consists of a representative director from each constituent association, that is, from each State association plus representative directors from the few city associations (District of Columbia, New York City, and Chicago), which are directly affiliated with NTA and not included in State associations, and from the associations in Alaska, Hawaii, and Puerto Rico. In addition, there are 50 directors at large.

No association can sell the Christmas Seals printed by NTA unless it has a contract with the national association. This contract broadly outlines the fields of tuberculosis control work in which the constituent association may engage and provides in turn that a comparable contract must be in effect between the constituent association and its local associations. The actual Christmas Seal sale is conducted for the most part by the local tuberculosis associations, with State sales being conducted only in areas not covered by local associations. Ninety-four percent of the funds raised from the Christmas Seal sale remain in the States and local communities in which the sales are conducted. The national office itself does not collect funds.

The annual meeting of NTA and annual re-

Estimated number of tuberculosis beds, United States and Territories, 1904–53.



gional conferences provide for further coordination of activities between the national, State, and local tuberculosis associations. Coordination is facilitated further through the National Conference of Tuberculosis Workers, an association of employees of tuberculosis associations. Although independent, NCTW works closely with NTA and its medical section. Its full-time executive secretary has his office in the national office of NTA. His salary and the expenses of NCTW committees are paid by NTA. The annual meeting of NCTW is held at the same time and as a part of the annual meeting of NTA and ATS.

Association Services

It is difficult to list services from tuberculosis associations which are uniformly available throughout the country, because of the variations among them in financial resources, staff, and local needs. If proper relationships exist between the official agency and the tuberculosis association, the official agency will be fully aware of what services are available. In fact, the official agency should act to influence and encourage the tuberculosis association to fulfill its local function and the tuberculosis association should see to it that the official agency meets its responsibilities.

Services, generally available, which may be of special interest to the health officer are the following:

1. Supplying health education materials, statistically and medically accurate, designed for specific age and school groups, and in all types of media.

2. Offering current recommendations by American Trudeau Society committees on medical matters such as evaluation of therapeutic procedures in tuberculosis, use of BCG, and diagnostic standards.

3. Providing consultant services on adequate programs of teaching chest diseases in medical schools and teaching tuberculosis nursing in schools of nursing; suitability of a given tuberculosis hospital for affiliation with a school of nursing; case-finding programs including X-raying of admissions to general hospitals, industrial X-ray survey programs, and mass surveys of the adult population of the community; the various component parts of a rehabilitation program; intramural programs of patient education; adequate school health programs (not confined to tuberculosis); programs of public education.

4. Offering limited number of fellowships in the fields of teaching chest diseases in medical schools, tuberculosis research, postgraduate training in public health, training in social work, occupational therapy, and vocational counseling. These NTA fellowships are usually cosponsored by State or local associations.

5. Arranging conferences which bring together various resource groups in the community to plan jointly for the solution of tuberculosis or related problems, or to make available to them most recent additions to knowledge in the field under consideration.

6. Taking effective educational action in problems of legislation and appropriation affecting tuberculosis control.

The Challenge

Now in its 50th year, the association can with some pride mark the anniversary with emphasis on the major accomplishments of the past:

The establishment of over 3,000 local tuberculosis associations throughout the entire country, involving hundreds of thousands of volunteers and over a thousand paid workers.

The expansion of the Christmas Seal sale from a few thousand dollars to approximately

$24,000,000 per year, a revenue that has made possible greater treatment facilities and expanded research, both of which have helped to bring about an accelerated decline in the tuberculosis death rate.

Stimulating the establishment of official programs of tuberculosis control throughout the country which represent an expenditure of over half a billion dollars annually, exclusive of hospital construction.

These pleasant reflections on accomplishments are no signal to relax. NTA is much more interested in the challenge of the present and future problems. NTA is keenly aware that each year there still occur over 100,000 new active cases of tuberculosis; that there are a total of some 400,000 active cases, of which about 150,000 are unknown to health departments; that there are about 1,200,000 cases, both inactive and active, needing supervision; and that there are millions of people who react to tuberculin, indicating past infection and potential activation of frank disease.

The association is also keenly aware of the challenge confronting it in curtailment in appropriations and staff at all levels, which has resulted in serious reduction in case-finding activities. NTA is convinced that the availability of superior methods of treatment makes the finding of cases all the more important from the standpoint of both the patient's welfare and protection of the public.

On the research front there continues the need to find even better drugs and to determine the best combination of known drugs. The important challenge of developing a vaccine without the limitations of BCG is still pressing.

In the administrative field, there are challenges to be met, such as the adjustment in administrative practices to conform with, and take advantage of, current trends. The reduction in the average duration of stay in the hospital by tuberculosis patients presents a particular challenge in adjustment, for now there is the need to revamp our estimation of numbers of tuberculosis hospital beds required in a given community and the types and locations of new facilities. Also we must cope with problems resulting from the shift of a substantial portion of the tuberculosis load from services in the tuberculosis hospital to extramural community health and welfare services—services of public health nurses, social workers, vocational guidance and training workers, and of outpatient departments and clinics.

The inevitable, and in many respects desirable, prospect of actively bringing back the general practitioner into the tuberculosis picture to a greater extent than has been the case also presents some challenging aspects.

A nationwide system of intelligence, involving repeated tuberculin testing of an adequate cross section of the population, is urgently needed as a means of keeping currently informed as to progress in the control program and to reveal areas needing special attention.

Finally, every effort must be made to maintain and strengthen further those factors which result in an hygienic environment and a high standard of living—education in proper nutrition, elimination of exposure to industrial silicious dusts, and so on—since in the absence of a universally applicable vaccine comparable with vaccines against smallpox and diphtheria, these factors are the ones responsible for bodily resistance to tuberculosis disease and serve as the barrier to a recrudescence of the tuberculosis scourges of the past.

PHR

Gamma Globulin Effect on Poliomyelitis In 1953 Field Trial

THE EFFECTIVENESS of gamma globulin in preventing poliomyelitis or in reducing the number of cases cannot be determined from the results of its trial administration during the summer of 1953. A committee of experts appointed by the Surgeon General of the Public Health Service reported that no beneficial effects were demonstrated from the use of gamma globulin in the mass inoculation of children in epidemic areas or from inoculation of members of the families of poliomyelitis patients.

The committee based its conclusions on data which had been collected and analyzed by the staff of the Communicable Disease Center of the Public Health Service at the end of the 1953 poliomyelitis season. The effect of gamma globulin in modifying the epidemic could not be determined because most of the inoculations in the 23 communities in which mass inoculation of children had been carried out had been given after the peak of the epidemic had been reached. Longer experience in the use of gamma globulin and more opportunity for scientific observation will be necessary before its efficacy can be determined.

However, the data collected showed that inoculation of family contacts with gamma globulin as soon as the first case of poliomyelitis in a household was recognized did not reduce the number of subsequent cases in the household nor did the inoculation of exposed persons before they developed paralytic poliomyelitis produce a measureable effect on the paralysis.

The Public Health Service sponsored the gamma globulin evaluation program in collabo-

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Prepared by the Bureau of State Services, Public Health Service. The full report of the National Advisory Committee for the Evaluation of Gamma Globulin in the Prophylaxis of Poliomyelitis will be published as Public Health Monograph No. 20. A summary of the committee's report appeared in the Journal of the American Medical Association, March 27, 1954.

Public Health

MONOGRAPH

No. 20

The accompanying report summarizes the findings of the National Advisory Committee for the Evaluation of Gamma Globulin in the Prophylaxis of Poliomyelitis. The committee's full report is presented in Public Health Monograph No. 20, published concurrently with this issue of Public Health Reports.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and major universities, and in selected public libraries.

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Gamma globulin in the prophylaxis of poliomyelitis. Public Health Monograph No. 20 (Public Health Service Publication No. 358). 178 pages. U. S. Government Printing Office, Washington, 1954. Price $1.25.

ration with the Association of State and Territorial Health Officers, the American Physical Therapy Association, and the D. T. Watson School of Physiatrics, which is affiliated with the University of Pittsburgh School of Medicine. The members of the committee of experts included State and city health officials and leaders in poliomyelitis research. Field activities were directed by Dr. Abraham M. Lilienfeld of the Johns Hopkins University School of Public Health, a consultant to the Communicable Disease Center. The Public Health Service was represented by Dr. Alexander D. Langmuir, chief epidemiologist at the Communicable Disease Center. The other members of the committee were:

Lucy Blair, consultant, professional services, American Physical Therapy Association, New York, N. Y.; John Chapman, M.D., epidemiologist, Los Angeles City Health Department, Los Angeles, Calif.; Roy F. Feemster, director, division of communicable diseases, Massachusetts Department of Public Health, Boston, Mass.; Thomas Francis, Jr., M.D., professor of epidemiology, University of Michigan School of Public Health, Ann Arbor, Mich.

D. G. Gill, M.D., State health officer, Alabama State Department of Public Health, Montgomery, Ala.; A. L. Gray, M.D., director of preventable disease control, Mississippi State Board of Health, Jackson, Miss.; Morris Greenberg, M.D., epidemiologist, New York City Health Department, New York, N. Y.; William McD. Hammon, M.D., professor of epidemiology, University of Pittsburgh School of Public Health, Pittsburgh, Pa.

Arthur C. Hollister, Jr., M.D., chief, bureau of acute communicable disease control, California State Department of Public Health, Berkeley, Calif.; Robert F. Korns, director, bureau of epidemiology and communicable disease control, New York State Department of Health, Albany, N. Y.; John R. Paul, M.D., professor of preventive medicine, Yale University School of Medicine, New Haven, Conn.; John D. Porterfield, M.D., director of health, Ohio Department of Health, Columbus, Ohio.

Albert B. Sabin, director, Children's Hospital Research Foundation, Cincinnati, Ohio; Leonard M. Schuman, M.D., deputy director for division of preventive medicine, Illinois Department of Public Health, Springfield, Ill.; Thomas F. Sellers, State health officer, Georgia Department of Public Health, Atlanta, Ga.; and Jessie Wright, M.D., medical director, D. T. Watson School of Physiatrics, Pittsburgh, Pa.

Committee to Study Artificial Sweeteners

The Food and Nutrition Board of the National Research Council, at the request of the Food and Drug Administration, has named a committee to study the principles which should govern the use of artificial sweeteners in foods for special dietary purposes.

The primary purpose of the committee will be the development of a statement of general principles and of other factors for consideration in the formulation of a policy on the use of artificial sweeteners in food.

The committee, which held its first meeting in January at Ithaca, N. Y., includes Dr. W. H. Griffith, chairman, professor of physiological chemistry, University of California Medical Center, Los Angeles; Dr. B. S. Clark, president, Institute of Food Technologists; Dr. P. L. Day, professor of biochemistry, University of Arkansas School of Medicine; Dr. Norman Jolliffe, director, bureau of nutrition, New York City Department of Health; and Dr. Charlotte Young, professor of food and nutrition, Cornell University.